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THE DENTAL PRACTITIONER

monthly journal for the Practitioner and his Staff

VOL. II, NO. 11 JULY, 1952

Incorporating the Official Supplement of
The Dental Laboratories Section of the Surgical Instrument Manufacturers' Association

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THE DENTAL PRACTITIONER

A Monthly Journal for the Practitioner and his Staff

(Incorporating the Proceedings of the British Society of Periodontology and the Official Supplement of the S.I.M.A.—Dental Laboratories Section)

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SOLE AGENTS: *Australia*: Robertson & Mullens Ltd., Melbourne; *Canada*: The Macmillan Co. of Canada Ltd., Toronto; *New Zealand*: N. M. Peryer Ltd., Christchurch; *United States of America*: Staples Press Inc., New York; *Denmark*: Einar Munksgaard, Copenhagen; *Norway*: Olaf Norli, Oslo; *Sweden*: Gumperts Aktiebolag, Göteborg.

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THE
DENTAL PRACTITIONER
A Monthly Journal for the Practitioner and his Staff

Vol. II, No. 11 July, 1952

EDITORIAL

SPECIALIZING

THIS is an important month in dentistry. The International Dental Congress is being held in London as well as other important meetings. The American Dental Society of Europe is also meeting in London, and the European Orthodontic Society meets in Holland. The annual British Dental Association meeting is being held later this year, in September. One of the features of all dental meetings, wherever they are or whatever body holds them, is that each department of dentistry, and there are many of them, stands on its own feet as a speciality. Yet apart from the teaching schools there is very little specialization in the general dental profession. The only main specialization is orthodontia. This is undoubtedly a great drawback, for the consultant dental surgeon has apparently to specialize in all branches except orthodontics. One has only to go to any large dental meeting to realize that this is impossible. It tends to narrow the profession down, and with the vast amount of theoretical knowledge to know less and less about more and more. Most men when asked about specializing in children's dentistry think of orthodontics. This is quite wrong, as there is a wide-open field for specializing in pedodontics. This subject is, to many, of far greater importance than orthodontics, and would in fact if done correctly prevent a lot of orthodontics ever being needed. The main cause for this lack in the profession is probably economic, but we should not close our eyes to this professional need.

For this month's issue we are indebted to the members of the staff of the Eastman Dental Hospital for the main articles. This is the second group of articles by the Eastman, and we are sure that their contributions are appreciated by our readers.

A DENTAL SURGEON'S LECTURE VISIT TO YUGOSLAVIA AND ITALY

DR. ALEXANDER MACGREGOR, the Harley Street oral surgeon and dental consultant to several London hospitals, completed a successful lecture tour for the British Council in Yugoslavia and Italy during May and early June.

At the invitation of leading Yugoslav dental surgeons, he lectured on recent advances in British dental surgery in Belgrade, Ljubljana, and Zagreb. He also lectured on the specific subjects of "Treatment of Jaw Injuries" and "Anatomy and Physiology of Lymphatics". On his way back from Yugoslavia he paid a short visit to Italy to lecture at the Eastman Clinic in Rome.

THE PINLAY PREPARATION AS A BRIDGE ABUTMENT

By **G. A. MORRANT**, B.D.S. Lond., D.D.S. N.U. Chic.

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INTRODUCTION

THE pinlay, or pinledge preparation as it is often called, for incisor or canine bridge abutment, has been known in one form or another for many years (Burgess, 1917; Doxtater, 1931; Gillett and Irving, 1932; Iwansson, 1934, Tylman, 1947). In this country, one of its foremost protagonists has been A. R. Thompson, who has popularized it, particularly in relation to the spring cantilever bridge (1946, 1947). The advantages of the preparation over the more customary and better known threequarter crown can be summarized as follows:—

1. Exceptional retentive properties, especially in cases of short clinical crown where the length of groove obtained in a threequarter crown would provide inadequate retention.

2. More latitude in the degree of extension of the preparation where prevention must be sacrificed for æsthetics. This can be done without appreciably affecting retention.

3. A minimum destruction of tooth tissue.

The main disadvantage of this preparation is that it must be modified where cavities or existing fillings prevent the sinking of pins into sound dentine. However, the substitution of a groove instead of a pin on the affected mesial or distal surface of the tooth is easily made. The pinlay may be considered under the headings of preparation, obtaining the pattern, and temporary dressing.

X-rays should be taken to ascertain that the pulp chamber is not abnormally large.

PREPARATION

Before commencement, local anæsthesia should be used, since although there is comparatively little cutting into sound dentine, the pin-holes sink deeply therein. The preparation is made in six distinct stages (*Fig.* 1):—

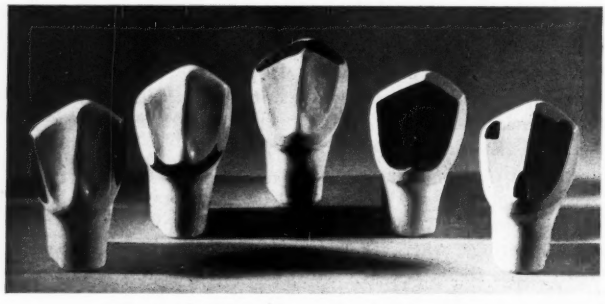

Fig. 1.—Stages in preparation of canine pinlay.

1. Mesial and Distal Slices.—These may be made with carborundum or diamond disks. The slices should be parallel to each other or converge towards the incisal and should be extended gingivally to the sulcus, leaving mesial and distal surfaces of the tooth free from undercuts. The initial direction of cut is thus important, particularly on the mesial, where it should not extend further labially than it is desired to show the gold. Therefore, in cases where the maximum æsthetic result is required the slice will hardly be taken beyond the contact point.

2. Reduction of Palato-gingival Enamel.—In a tooth where the epithelial attachment on the palatal aspect is high up towards the cingulum of the tooth, the palato-gingival enamel may present no undercuts and may be left alone. It should be borne in mind at this stage, however, that the pattern will be withdrawn in the long axis of the tooth, and if the enamel in this region is bulbous, providing an undercut at the gingival margin, it should be removed with a cylindrical or pointed diamond stone.

3. Reduction of the Incisal Enamel.—In this stage, the same principle should govern as in the threequarter crown, but it should be noted that no groove is to be placed in this incisal bevel. Most of the enamel is removed from the palatal aspect and as much labial enamel as possible is preserved. This operation may be carried out with a small diamond mounted stone.

4. Reduction of Main Palatal Surface.—The main bulk of this surface is now reduced with a somewhat larger stone. The general contour of the palatal aspect of the canine or incisor should be followed. It should be noted that no more tooth structure need be removed than is necessary to clear the bite and allow an adequate thickness of gold in the abutment. In the majority of cases, the enamel is not completely removed. The articulation is then tested in lateral excursion to ensure that this clearance is maintained.

5. Forming the Ledges.—The ledges which are to serve as starting platforms for the pin-holes are next prepared. They are three in number and their situation is a matter for careful choice. The ledges have frequently to be started in enamel but should be made to enter the dentine just inside the axial amelo-dentinal junction. The cingulum ledge is first prepared and should be situated so that when formed the palatal edge will be approximately 1 mm. from the palato-gingival wall. The incisal ledges are started at the junction of the incisal bevel and main palatal facet and are placed as far mesially and distally as practicable to avoid being over the pulp. However, a ledge should not encroach on to the surface of a slice. Owing to the necessity for careful siting and the fact that the ledges will probably be started in enamel, it is advisable to commence their formation with either carborundum or diamond stones, completing them with a No. 2 fissure bur to provide a sharp and clear-cut form. In preparing the ledges, stones and burs should be held as near as possible in the long axis of the tooth.

6. Drilling the Pin-holes.—The final stage of drilling the pin-holes may at first sight appear to be the most awkward, but providing the preparation has been made correctly up to this stage, the sinking of the holes should not present undue difficulties. A small rosehead bur (No. $\frac{1}{2}$) in the straight handpiece, using direct vision, is the approach preferred by the author, the patient being high in the chair. The aim is to set the pins parallel to the long axis of the tooth and the handpiece should be lined up accordingly. Place the bur on the cingulum ledge, first checking the bucco-palatal direction and then the mesio-distal inclination. The lip should be lifted to expose the buccal sulcus in order to see more easily the direction of the root. Attention is then paid to the rest for the fingers. When this has been found comfortable, an attempt should be made to see if the handpiece can be transferred to each ledge without moving the finger rest. It is usually possible to find such a position, which will greatly assist in keeping the three shafts parallel. The holes are then drilled, in any order, but without altering the finger position. In sinking the pin-holes it is difficult to go too far, in that the widening shank of the bur binds on the top edge of the hole and prevents the further progress of the head of the bur. It will be found that this limiting factor provides a pin-hole of about 2–3 mm. in depth, and it may be said here that the majority of the failures with this abutment are due to inadequate length of pins—2 mm. is the minimum satisfactory length.

OBTAINING THE PATTERN

The pins are next prepared from a length of irido-platinum wire of the same diameter as that of the bur used. In the case of a No. $\frac{1}{2}$ rosehead (Ash) the gauge is 0·02 in. Before starting, it must be ascertained that there is

no bur on the wire resulting from the previous cut which would bind in the shaft. One end of the length of wire is inserted into a pin-hole as far as it will go. The wire is then seized with a pair of long-nosed pliers as close as possible to the surface of the tooth and withdrawn.

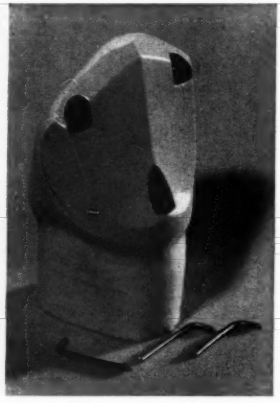

Fig. 2.—Model of preparation with pins.

The short end of the wire is now bent at right angles without altering the grip of the pliers. Only after this is the wire cut on the longer side about 1 mm. from the bend, which ensures a pin of the right length with a small turnover at the top for retention in the pattern. The three pins are now laid aside carefully so that the pin for each hole can be easily identified (*Fig.* 2).

Most operators have found that the indirect method, using a model formed from a copper ring impression of the preparation taken with the pins in situ, fails to produce an accurate result. The platinum foil matrix and direct wax pattern method has been evolved as one way of overcoming the inaccuracies. The procedure is as follows: A piece of $\frac{1}{1000}$-in. thick platinum foil, as used in porcelain work, is cut from the sheet and approximately adapted over the prepared portion of the tooth. A useful instrument for this is a beaver-tail burnisher. Marking of the limits of the preparation on the foil is all that is necessary at this stage. The foil is then removed and carefully trimmed with scissors to these limits. It is now replaced and closely adapted to the whole surface of the preparation, including the pin ledges. A useful aid for holding the foil in place during this process is a narrow strip of rubber dam about 1 cm. wide by 5 cm. long. This is stretched, slipped through one contact point, taken around the palatal surface and back through the opposite embrasure, the two ends being gripped on the labial surface of the tooth. The foil can then be burnished through the rubber dam. On removing the dam, the pins, held in the pliers for convenience, are inserted through the foil into the pin-holes, care being taken that they are pushed right home (*Fig.* 3). A very small quantity of sticky wax is melted on a plastic instrument and conveyed to the top of each pin, thus fixing it to the foil. Only sufficient wax should be used to fill the ledge.

At this stage, originally the technique advocated removal of the platinum foil and pins on a piece of sticky wax. The matrix was invested in soldering compound and the pins soldered to the foil. This was then tried in the tooth again and the foil re-adapted. The object of this procedure was to make sure that the pins were parallel and would withdraw together without distortion of the matrix. However, it is thought now that this step is unnecessary and is likely to be a cause of more errors than it will avoid. It is also said that

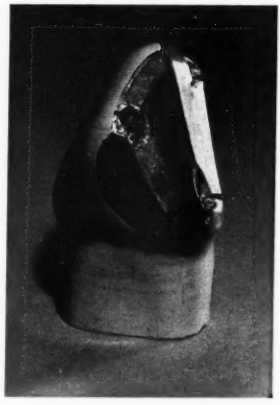

Fig. 3.—Foil adapted to preparation. Pins in situ.

solder rot of the pins may take place after some time. It is probably just as easy, and certainly quicker, to proceed straight away to the direct wax-up of the foil matrix.

It is a help to shape the inlay wax into a flat shovel-shaped form which will approximate to the palatal surface of the tooth and extend into the mesial and distal embrasures. To assist in adapting the wax, a celluloid strip may be passed through the mesial slice, taken round the palatal surface and back through the distal embrasure in the same way as the piece of rubber dam previously described. This is left in situ while the wax is being softened. The wax is then applied in a slightly more plastic state than normally, between the strip and the tooth, and the strip tightened. This will attach the wax firmly to the foil and also draw it labially into the mesial and distal embrasures. Care should be taken that the foil is quite clean and dry before the wax is applied. The strip is then removed and the carving completed to the outline of the foil.

After carving and checking the bite, a thick sprue is inserted on the palatal surface between, and slightly to the gingival of, the two incisal pins. It should be approximately parallel to the pins. (A hollow tube sprue probably provides the strongest attachment.) Alternatively, a double sprue may be used. The whole matrix is then carefully withdrawn and examined (*Fig.* 4). If it is found that the wax has not been drawn right to the edge of the preparation, a little additional wax may be flowed on to the foil in these situations. The rigid foil matrix will prevent distortion of the pattern, provided that only a little wax is added in this way.

The pattern is cleansed and invested in the usual fashion, but a high heat (700°–750° C.) burn-out technique is needed in order that the foil should attain a temperature which will allow proper fusion of the gold to it.

TEMPORARY DRESSING AND COMPLETION

Since in the majority of cases very little dentine has been exposed, it is usually only necessary to provide a temporary dressing in respect of the pin-holes to prevent the impaction of food down a hole. One method, utilizing paper points, is as follows: After drying the preparation, a paper point is pushed as far down the hole as possible, withdrawn slightly and cut with a pair of fine scissors at the tooth

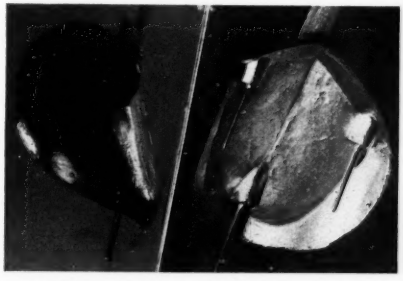

Fig. 4.—Pattern ready for investing.

surface. The point is then pushed home again into the hole without having been disengaged from it.

At one time, the author covered the pin-holes with a piece of permanent gutta-percha on top of the paper points and sealed it off flush with the outline of each ledge, but it was found that these pieces of gutta-percha frequently became dislodged and sometimes brought the paper point away with them. In any case, the patient did not seem to be aware of the absence of the dressing. It is therefore considered that the paper point alone is sufficient in most cases. A warning should be given against sealing the pin-hole and ledge with zinc oxide and eugenol even if the paper point is in place. The paste may well be drawn up the paper point, rendering it very difficult to remove, even to the extent of necessitating the use of the bur.

The restoration should be cast and placed as soon as possible to avoid closure of the contact points and further eruption of the tooth into occlusion. If the remaining stages of the bridge are completed as rapidly as possible, no undue trouble should be expected in this direction. The preparation is not usually undertaken until a close series of visits is possible. If the pins have been made of sufficient length, no difficulty should be

encountered in engaging them into the holes and seating the casting into place.

This abutment combines features both of the intra-coronal and extra-coronal types and the resultant retention is exceptional. In selected cases it has marked advantages over the three-quarter crown and any slightly increased time taken in its fabrication is adequately repaid by the creation of a remarkably effective and useful bridge retainer.

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THE PROBLEM OF SPACE MAINTENANCE

By **P. M. C. JAMES**, L.D.S. R.C.S., D.P.D.

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THE deleterious effect of the premature loss of the deciduous molar and canine teeth is well known; and although there is some divergence of opinion as to whether this early loss causes malocclusion *per se*, there can be no doubt that it is a complicating factor in the successful treatment of many underlying orthodontic abnormalities. A great deal of the orthodontist's time is spent correcting the effects of this early mutilation before the treatment of the basic problem can be attempted.

There are many degrees of severity in the clinical effect of premature loss, according to the skeletal and muscle pattern of the individual concerned. It is not the purpose of this communication to consider in detail the variations of deformity associated with specific types, but it is obvious that the damage will be of a more serious nature in an arch with a small apical base than when a corresponding loss occurs in large, well-formed jaws. An immediate problem therefore presents itself. If there is a small apical base it may well be that permanent teeth will have to be removed from the arch later to correct the overcrowding. If this is going to be necessary it is obviously a waste of time to maintain a space for perhaps as long as five or six years if this space is not to be utilized in the end. The difficulty is the decision, at an early age, that permanent extractions will, in fact, be necessary to accommodate all the teeth, and only clinical experience will supply the answer. In doubtful cases it is wiser to maintain the space until that doubt becomes a certainty, one way or the other. In this way, at least, no harm will be done.

It is not always practicable to fit space maintainers in every case of premature loss, but there are certain types in which space should be maintained at all cost. In the mandible, where the tooth tissue relationship is unfavourable, i.e., the teeth too large for the dental base or the dental base too small for the teeth, it is necessary to accommodate all the teeth if possible, otherwise collapse of the lower arch occurs. This category includes all Skeletal Class II cases in particular. For example, in Class II, Division I (occlusal) abnormalities with some degree of inferior retrusion (Skeletal II), the prognosis for correcting the incisor relationship is already poor, but when complicated by a collapsed lower arch even a reasonable end result is impossible, unless treatment is first carried out to regain space.

The clinical picture of a collapsed lower arch is only too well known. The first permanent molars tilt forward into the space, and the lower canines and incisors tilt backwards, thus in one causing the destruction of the correct upper-to-lower incisor relationship and effectively closing the space into which must erupt the lower premolar teeth. In most cases the upper arch also collapses on the lower, as a result of this. A great deal of time is spent by

orthodontists in opening up the lower second premolar spaces to allow the eruption of these teeth. The other case when it is particularly important to keep the space is in the type of Skeletal III with a contracted maxillary apical base. Here early loss in the upper jaw results in collapse of the upper arch.

Frequently mothers bring small children to the dental surgeon in some anxiety because the lower permanent lateral incisor is erupting lingual to the deciduous canine. The dentist is asked to remove this canine to "make room" for the lateral. This condition is usually indicative of an insufficiency of space in the mandible at that time, and to remove it would be to aggravate the condition by allowing the buccal segment to move forward, thus further reducing the available space. This of course does not apply to cases where a controlled serial extraction of deciduous and permanent teeth is deemed necessary for orthodontic treatment.

As well as varying with skeletal and muscle form the degree of deformity will vary with the age at which the tooth is lost, and also with which tooth it is. Generally the earlier the loss the more severe will be the malocclusion and, other things being equal, loss of the second deciduous molar is more serious than loss of the first.

What steps then may be taken to prevent the ill-effects of early loss of deciduous teeth? Obviously, the ideal thing is its prevention by inspection and conservation of these teeth from an early age. This not only prevents orthodontic complications but also maintains the functional efficiency of the masticatory apparatus and prevents the evil effects of systemic sepsis. Infected deciduous teeth are not always painful, but it is as indefensible to keep infected teeth for the maintenance of space as it is to remove them unnecessarily. Where teeth are inevitably lost the spaces may effectively be kept open by appliances, which should be fitted as soon after the extraction as possible. Ideally, they should be prepared beforehand to allow immediate insertion, as in some cases tooth movement is very rapid.

There are two types of space maintainer, fixed and removable. They are both effective if properly constructed, and choice between them depends on factors concerning the patients themselves—whether their oral hygiene is good, bad, or indifferent; whether they are co-operative or otherwise; how long they will have to wear them; whether the loss is unilateral or bilateral, etc. The choice is a matter for individual discretion, and it is not proposed to discuss it in detail.

REMOVABLE SPACE MAINTAINERS

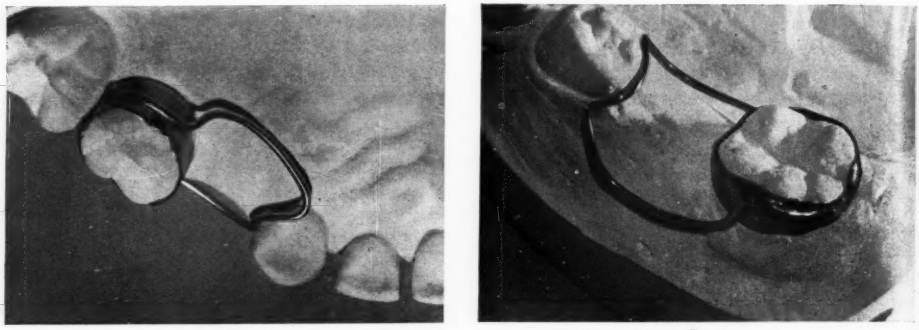
A simple acrylic plate is quite effective, and has several advantages. It may be removed

Fig. 1.—Lower acrylic plate maintaining $\overline{\text{D|CDE}}$ spaces.

and cleaned by the patient, and as it is only necessary to wear a space maintainer for half the twenty-four hours, it may be left out either by night or by day, whichever seems more suitable for the individual concerned. In young children it is a good idea to let them wear it in the day-time at first until they are accustomed to the feel of the appliance, then change over to nightly wear. If it is small enough to be swallowed a thick labial wire should be incorporated, making sure that this is not active. The most useful type of clasp is the Adams modified arrowhead, in 0·7 mm. stainless steel wire, and the plates are best made of clear acrylic so that the points of eruption of permanent teeth beneath them may be accurately observed to facilitate the necessary grinding when the time comes. (*Fig.* 1.)

The main disadvantage of this type of appliance is simply that it *is* removable. Unless the

co-operation of the patient and the parent is assured, the plate may be left out on some pretext or other, and next time the child attends he has it in his pocket and complains that he "can't get it in". By this time the damage may have been done; so if there is any dubiety on this count the dental surgeon may decide that a fixed space maintainer is indicated.



A B

Fig. 2.—A, Stainless steel type of appliance. The band is attached to the $\frac{|E}{}$ and the wire maintains the $\frac{|D}{}$ space. B, Stainless steel appliance maintaining the $\frac{|E}{}$ space.

FIXED SPACE MAINTAINERS

There are several varieties of fixed space maintainer, but the best of these appears to be those incorporating the orthodontic type of band; made from stainless steel tape 0·15 mm. or 0·175 mm. in thickness. In the construction of these bands a welder is of immense value, but if one is not available satisfactory bands can be made by a soldering technique. The band should, where possible, be attached to a deciduous tooth rather than to the first permanent molar. A piece of stainless steel wire (0·7 mm.) is bent up as shown in the photograph (*Fig.* 2) and attached, again by welding or soldering, to the buccal and lingual aspects of the band. The arms should be relieved away from the soft tissues, and be wide enough apart, where practicable, to accommodate an erupting premolar. When the spacing is bilateral a straightforward lingual arch may be used instead if preferred, attached to bands on the permanent molars or second deciduous molars, as indicated (*Fig.* 3).

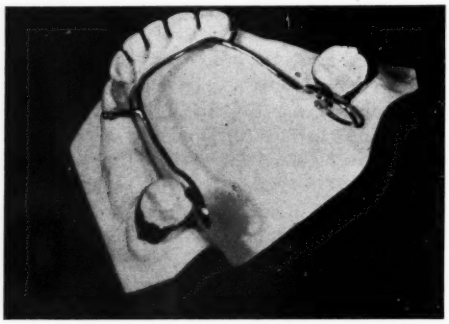
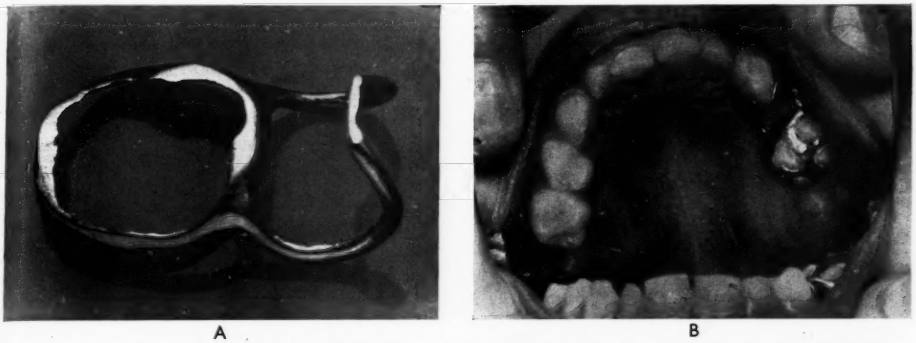


Fig. 3.—Lower lingual arch maintaining all deciduous canine and molar spaces.

Where it is necessary to cut down the chair-side time, cast metal space maintainers of the same design as the unilateral type above are very useful (*Fig.* 4). The retention of these is usually not as good as with the band type of appliance, as the spring of the stainless steel in these allows a good fit around the "waist" of the tooth. Some of this disadvantage may be overcome, if it can be fitted to a deciduous molar, by suitable preparation of the tooth. This merely consists of disking the mesial, distal, lingual, and buccal surfaces to eliminate the undercuts, and if, in addition, the occusal surface is stoned down the metal can be carried either wholly or partially over this surface, thus giving additional strength.

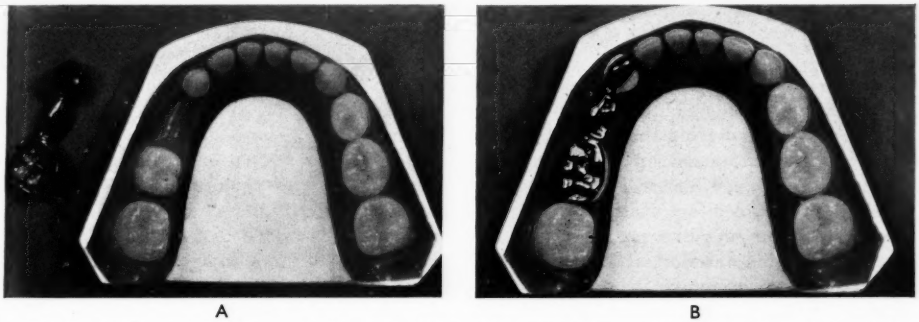
The method of construction is quite simple. A Zelex impression is taken, preferably before the offending tooth is extracted, and cast in stone, the appropriate tooth is cut off the model, and then the gingival margin of the tooth selected to bear the appliance is accentuated, and slightly deepened. The soft tissue is relieved away with tinfoil and warm No. 7 wax adapted to the model and trimmed to the desired final design. Sprues are attached, and the wax is lifted off the model, invested, and cast in the usual way. Ideally gold is used for the casting, but as this is not practicable in the great majority of cases, silver is a satisfactory substitute.

The disadvantage of all fixed types of appliances is the possibility of food stagnation around them, with its resultant gingival condition and increased susceptibility to caries. Good oral hygiene is very necessary and frequent inspections should be made to ensure this. It is also advisable to remove the appliance at least every six months, clean the teeth bearing the bands, and re-cement them. This is because pieces of cement may wear or chip away from the gingival margin of the band, permitting debris to enter the space, and often causing local decalcification of tooth substance.



A B

Fig. 4.—A, Cast metal space maintainer; B, Cast metal space maintainer to prevent further loss of $\underline{|D}$ space.



A B

Fig. 5.—A, Cast metal bridge type space maintainer. The extent of preparation of the $\underline{|E}$ can be seen if compared with the corresponding tooth on the other side. B, Cast metal space maintainer in position.

"D.P." COLOURED CHARTS

The coloured charts (Numbers 1 to 12), which have been featured in The DENTAL PRACTITIONER, are now available at the special price of 10/6 per set, post free, from the publishers at 42–44, Triangle West, Bristol, 8.

THE IMMEDIATE FULL UPPER DENTURE

By **J. H. LEE**, Dip. D.S., L.D.S. R.C.S.

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THE technical problems of constructing artificial dentures are increased in proportion as the patient progresses from the loss of a few natural teeth to the completely edentulous state and frequently the most difficult problem of all, the patient who has not only become edentulous but has failed to have artificial substitutes inserted until some considerable time later. The recognition of the value of obtaining the most essential factors directly from the patient cannot be disputed, but having obtained and incorporated these factors it is difficult to understand why, many months later, these valuable records are destroyed by completely remaking the denture. The term "temporary denture" should not be used in reference to this type of work. The tissue supporting the denture is the only temporary factor and the addition of new material to the inner surfaces should be the only alteration necessary. Believing that immediate full dentures are permanent, it is essential to develop a technique which will incorporate the fundamental principles which are applied generally to full denture construction. The method of fitting anterior artificial teeth into tooth sockets, without labial gum, is an unsatisfactory routine procedure and is only indicated when partial replacement is required. Rapid tissue changes surrounding these teeth cause loss of satisfactory retention shortly after insertion. To correct this deficiency the addition of new material to restore the labial gum can be a difficult and time-consuming technical procedure. Incorporating labial gum during the initial construction overcomes this difficulty, and furthermore, has the advantage of producing a more satisfactory alveolar ridge form, permanently maintaining natural expression and generally preserving a better relationship of the surrounding tissue to the denture surfaces.

The parts of the technique described will be related to two surfaces of the denture: (1) The supporting surface, which in the upper denture is concerned with the development of the physical forces of retention, or retaining the denture base in correct relationship to the supporting tissues. (2) The labial surface and anterior teeth by which the natural expression is maintained and the individual æsthetic effect reproduced.

1. To develop the physical forces of retention it is essential that the impression covers the greatest possible area of the supporting base tissues and maintains the closest possible contact with those tissues, both at rest and during function.

An impression taken in alginate hydrocolloid (Zelex) using a stock perforated tray, is not sufficiently accurate to fulfil these conditions. Distortion, due to the bulk of material, will occur around the labial and buccal peripheral areas. More often there is lack of extension into the tuberosity sulcus and the posterior palatal margin (post-dam) may not be in contact with the tissue, owing to the excess material falling away during the initial setting period. To rectify these inaccuracies, a plastic base plate is adapted to a stone model of this impression, forming a support in which the corrected impression will be completed. Care should be exercised in adapting these base plates, making certain that they cover as great an area as possible, particularly in the tuberosity region, and at the same time do not extend beyond movable tissue. They should be trimmed only to the mucobuccal fold in the buccal areas and to $\frac{1}{4}$ in. on to the lingual surfaces of remaining anterior teeth, and slightly over-extended across the posterior palatal margin. The final adjustment is made by trial in the mouth. When satisfactorily corrected, the posterior palatal margin is completed by the addition of green composition tracing stick, compressing this area to enable contact with the tissue to be maintained when a displacing force is exerted against the lingual surfaces of anterior teeth. Vertical dimension is established in the bite blocks and centric

relation registered in soft wax. The tissue side is then coated with a thin mix of impression paste and seated in the mouth under continuous biting pressure for several seconds to allow excess material to flow from the peripheral margins. The outline of the posterior margin is then accurately moulded by the functional elevation and relaxation of the soft palate during the swallowing of sips of water. Finally, the remaining margins are formed by the function of rinsing vigorously. (*Fig.* 1.) The impression may then be removed, examined, and corrected, if necessary several times. Relief areas are outlined in the mouth with indelible pencil and the markings transferred to the paste surface.

Fig. 1.—The corrected impression of the palatal and buccal areas to the distal surface of the canines.

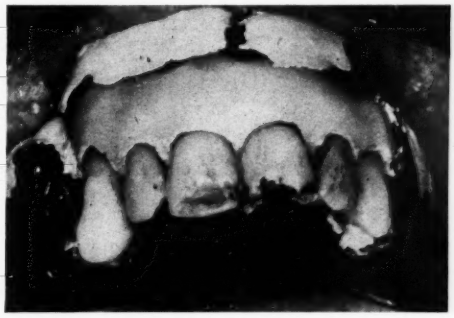

Fig. 2.—Correction of the labial region by means of the gum slip.

The anterior gum slip, later described, is fitted by trial to the anterior teeth. If necessary, additions to the peripheral margin are made with tracing stick, then a thin layer of impression paste added to the inner surface, pressed firmly into position, and the labial margin accurately determined by again requesting the patient to rinse vigorously. (*Fig.* 2.)

There is now a finished functionally outlined impression, covering the greatest possible area of the supporting base and having a surface maintaining the closest possible contact, except for that part occupied by the remaining anterior teeth.

With the base plate and gum slip forced firmly into position a stock tray partially filled with Zelex is inserted over them, completing the impression and enabling the gum slip and base plate to be removed in correct relationship to each other. Excess colloid material, extending beyond the peripheral region, is removed to $\frac{1}{4}$ in. below the margin, to give a boxing effect to the impression. This is cast in stone and duplicated to produce working models.

2. The average patient has no conception of the artistic effect achieved by the setting of modern artificial teeth in correctly shaded acrylic material bases, and frequently does not appreciate the results obtained, but cannot explain why. More gratifying results are obtained by the reproduction of the patient's own irregularities, the patient not having had time to forget the particular arrangement of the natural teeth, as is often the case after an edentulous waiting period.

Any modifications made should tend to correct unsightly shaped teeth and generally have the tendency to improve without losing the original effect. Plastic teeth offer possibilities in this field not possessed by porcelain teeth. Especially is this true regarding variations of individual tooth shape and colouring.

The reproduction of individual æsthetic characteristics, mainly depend on: (*a*) Colouring and shading the gum slip. (*b*) Copying individual tooth form.

a. Natural teeth are not admired unless some gum is visible, and the pleasing effect is produced by the contrast of the colour of the teeth, gums, and border of the lips. During normal conversation only the tips of the teeth

are seen but when smiling and laughing the colour of the gum becomes the dominating contrast, and in an artificial substitute probably has more influence on the æsthetic effect produced than the shape of the teeth.

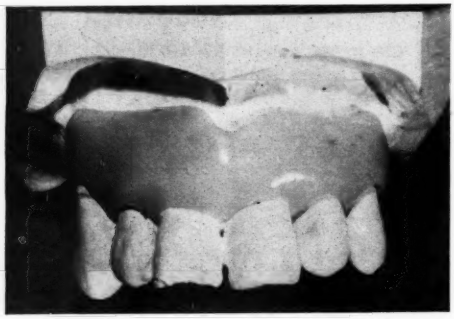

Fig. 3.—The gum slip formed in wax on the original model.

Before construction of the gum slip the basic colour is first determined by aid of previously made gum slip shades (Johnson, 1946). Correct colour should blend with the natural gum and the inner surface of the lips and cheeks, with a final reference to the general colouring

Fig. 5.—Gum slip checked for effect produced by insertion in the patient's mouth.

of the complexion. To the original model a thin layer of wax is moulded to the anterior region, extending from the canine on one side to canine on the other, trimmed around the necks of the teeth, removed, processed and lightly finished in acrylic material (*Fig.* 3). To modify the basic colouring the whole of the inner surface is now coated with a clear solution (monomer 1 part, polymer 4 parts, chloroform 10 parts), incorporating red mineral stain, allowed to dry for several minutes and so

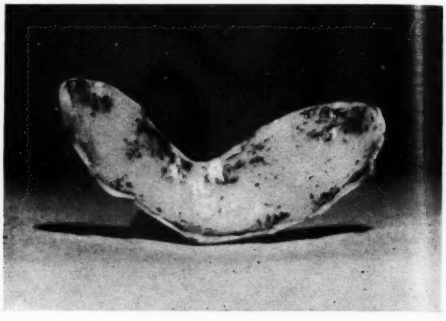

Fig. 4.—The inner surface of the gum slip with areas of modifying stain remaining.

become fixed to the gum slip. At the chairside, areas determined to be free from stain are removed with a No. 8 rosehead bur leaving generally some stain in the region of the interdental papillæ and depressed areas between root prominences (*Fig.* 4). Frequent reference is made directly to the patient, and a final estimation of effect produced is checked in the mouth by inserting the slip under the lip, and over the anterior teeth (*Fig.* 5). Any additions or further removals can then be made until a satisfactory result is obtained. When completed, a protective coating of clear solution is added over the whole inner surface. Before using for the final impression of the labial region the inner surface should be smeared with a light film of "Vaseline", to prevent adhesion of impression paste material.

On completion of the trimming and setting of the artificial teeth to the model, the gum slip is waxed into position so that it is fitting accurately to the necks of the artificial teeth and in contact with the model along the peripheral margin. The outer surfaces of the slip should, as near as possible, be in a similar relationship as the natural gum, to the inner surface of the lip. If there is to be much surgical reduction of the alveolus, owing to the shortening of the anterior arch from canine

to canine region, it will be necessary to reduce the slip also by dividing it with a fine saw through the midline, and fitting each half separately (*Fig.* 6). Any material to be removed is ground from each cut surface until both fit accurately, a procedure similar to the fitting of the now obsolete porcelain gum blocks.

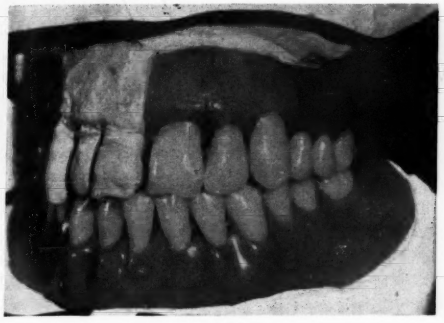

Fig. 6.—Waxing of the divided gum slip to the model and artificial teeth.

During the packing process the slip is retained in position in the flask whilst acrylic dough is pressed into the mould, thereby permanently incorporating it into the finished denture (*Fig.* 7).

b. When reproducing the natural teeth, the method of duplicating each tooth in wax, owing to contraction and loss of detail, is not as satisfactory as removing each individual tooth from the stone model.

Each tooth is separated on the model by fine interproximal saw cuts, extending vertically for half an inch beyond the gingival margin, carefully removed, and shaped with projections simulating dummy "roots" to enable the teeth to be more easily handled during staining and finishing. These "roots" are later ground away during the setting of the teeth to the model. The stone teeth are coated with a separating fluid and then invested with the junction of the two halves of the flask meeting slightly below the midline of the mesial and distal surfaces, and just above the incisal tip on the lingual surface of each tooth. The flash line of excess material can be then easily removed without distorting the shape of the tooth. The whole tooth is then processed in body colour, correct shading of which has previously been determined by reference to the natural teeth, removed without damaging the surfaces of the mould, and lightly finished. At the chairside the outline of incisal hue present in the natural tooth is determined, and a similar amount ground from the labial, mesial, and distal surfaces of the acrylic tooth. Any modification in appearance of the teeth by the addition of brown or yellow stains, or the imitation of synthetic fillings is then reproduced on this surface. By frequent reference to the natural teeth further addition or removal of stain can be easily made until the desired effect is obtained. Each tooth is then replaced in the original mould and sufficient incisal acrylic material added to replace the amount ground away at the chairside.

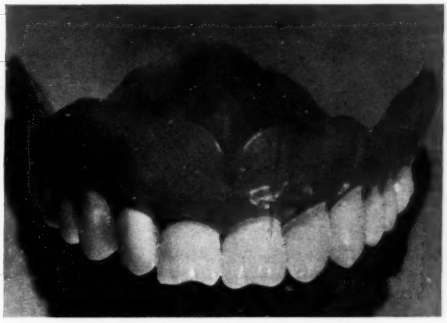

Fig. 7.—Completed denture incorporating the gum slip.

Although there are other important technical factors required to be fulfilled before success can be expected for this type of treatment, a securely retained denture which æsthetically defies detection as an artificial substitute, does substantially eliminate the fear and anxiety experienced by all patients during the first few days following the insertion of their new dentures.

REFERENCE

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HÆMORRHAGE IN DENTAL SURGERY

By **E. L. HAMPSON**, B.D.S. Lpool., H.D.D. Edin., F.D.S. R.C.S. Eng.

THE purpose of this article is to review the newer methods of controlling hæmorrhage which are available to dental surgeons. The older, which depend on the escharotic drugs, are fully described in text-books and are therefore touched on here only incidentally.

It is now recognized that the body has two defences against hæmorrhage—the response vessel walls make to injury, and the blood's coagulating mechanism. A detailed description of the former is not attempted here, and would in any case serve little purpose because it has not yet been definitely explained. Its importance is illustrated by Macfarlane's (1938) well-known case of a patient whose blood completely lacked fibrinogen, presumably from birth, and therefore could not clot, but who reached the age of eight years without suffering bleeding which could not be controlled. Such bleeding as did occur during the eight years was countered by vascular defence. The coagulating mechanism is, however, sufficiently well known and as a result of the work of Alexander Schmidt and of Morawitz (Morawitz and Lossen, 1908) a simple theory which will provide the practitioner with a working basis has been evolved. It can be expressed concisely in the form of two equations:—

Prothrombin + Thromboplastin + Calcium⟶ Thrombin
Fibrinogen + Thrombin⟶ Fibrin

It will be seen that four primary factors are required for the clotting of blood. These are prothrombin, thromboplastin, calcium, and fibrinogen. When one of them is lacking the clotting process is either wholly inhibited or markedly delayed. The most important facts known about these agents can be summarized as follows:—

Prothrombin.—This is the precursor of the active coagulating enzyme thrombin. Chemically it is believed to be closely related to globulins. It is rendered inactive by heating to 60° C., and can be removed from the plasma by such agents as magnesium oxide. It is found in excessive amounts in the plasma and does not appear to be derived from the platelets. Quick (1940) has devised a method of determining prothrombin and a standard measurement called the "prothrombin time" has resulted, which in the normal subject is 16 to 17 seconds. The method depends on the estimate of the clotting time of oxalated plasma after adding an excess of thromboplastin and a fixed amount of calcium. Quick has prepared a chart in which there is a correlation of the clotting time and the prothrombin. Studies on the prothrombin level of the blood reveal a constancy of the normal content and a large excess over the minimum required to coagulate the blood in the normal individual. It has been demonstrated that a loss of 80 per cent of the prothrombin can occur before there is any appreciable prolongation of the coagulation time, and clinically it has been found that serious bleeding does not occur till the prothrombin level falls below 20 per cent.

Thromboplastin.—In the presence of ionized calcium this substance converts prothrombin into active thrombin. The term thromboplastin has been discarded by some and thrombokinase used instead, because it was shown by Eagle and Harris (1937) that trypsin can change prothrombin into thrombin. It is therefore suggested that thromboplastin may be some form of activating enzyme. Other names have been used, and some of them are tissue fibrinogen, cytocyme, thrombocyme, cephalin, and platelet factor. Thromboplastin is derived from many sources, such as the blood-platelets, brain, lung, and thymus. It seems never to occur free, but to be liberated where tissue cells are ruptured or injured. The platelets are the only source of thromboplastin in blood uncontaminated by tissue juices. It is highly probable that cephalin is a component of the thromboplastin complex.

Calcium.—Calcium IONS are needed for the conversion of PROTHROMBIN to thrombin. Ferguson (1934) reports that calcium alters the platelet in such a way that the osmotic pressure inside the cell increases and it soon disrupts. It also appears that calcium is not necessary for the action of thrombin on fibrinogen.

Fibrinogen.—This is a labile plasma-protein which is converted from a colloidal sol to an insoluble gel by the action of thrombin. The fibrin then forms fine threads which enmesh the cellular components of the blood. Tocantins (1935) has shown that the platelets attach themselves to the fibrin threads and in some way assist the process of clot retraction. Fibrinogen is found in lymph, exudates, and transudates, as well as in the plasma.

Thrombin.—This is not a primary factor, but results from the interaction of prothrombin, calcium, and thromboplastin. Most authorities agree that thrombin is an enzyme which acts specifically on fibrinogen to produce fibrin.

INVESTIGATIONS

When there is a history of excessive bleeding after surgery, certain investigations should always be undertaken. The more involved tests are usually performed in the hæmatology department of a hospital.

The *coagulation time* is a measure of the clotting powers of the blood. A simple method of determining it is to obtain some of the patient's blood by skin puncture, or from one of the veins, and to put two drops on a glass slide. A needle is passed through the blood every minute and coagulation has started when a thread of fibrin is removed. This normally takes 2 to 4 minutes. Taylor (Pohle and Taylor, 1937) has devised another method, in which care is taken to avoid contamination with tissue juices, and this gives a coagulation time of from 6 to 12 minutes.

The *prothrombin time* can be obtained by Quick's method, which has already been mentioned and is 16 to 17 seconds.

The *bleeding time* is obtained by absorbing the blood from the lobe of the ear every half minute until bleeding ceases. This is from 2 to 8 minutes in the normal subject.

Clot Retraction Time.—The clot should begin to retract within a few hours and should be complete within 24 hours. Macfarlane and Lucia's method is fully described in works on hæmatology (e.g., Whitby and Britton, 1947). The clot retraction time is abnormal in thrombocytopenia, fibrin-penia, and some cases of hypoprothrombinæmia. In hæmophilia coagulation of blood is slow, but the clot, when it is eventually formed, has normal retractile power.

The Capillary Resistance Test of Hess.—A pneumatic armlet is placed around the upper arm and the pressure in it raised to halfway between the systolic and diastolic pressures. At the end of five minutes the armlet is removed and the arm examined. If the test is positive, multiple purpuric spots are distributed over the arm below the point at which the armlet is applied. This test is always positive in essential thrombocytopenia and other conditions where the platelet count is low. The purpuric spots occur also in scurvy, and occasionally a few minute petechiæ may appear even in healthy people. Vitamin P also appears to influence capillary permeability.

The Friability of the Clot.—This is determined by washing out the clot with water. If it can be done easily the clot is not abnormally friable.

BLOOD DISEASES AND OTHER CONDITIONS PREDISPOSING TO HÆMORRHAGE

The blood diseases, anæmias, leukæmias, and purpuras, which might predispose to hæmorrhage can be detected by a differential blood-count. Often excessive bleeding is the first indication of the patient's condition, because many patients appear normal on casual examination. Cases quoted later will illustrate the sort of change from normal which goes on in the blood diseases. Those diseases which predispose to excessive hæmorrhage often manifest themselves in the mouth, on the lips and face, or in the neck. If the dental surgeon can interpret these manifestations when they occur, serious complications can be avoided, and perhaps a patient's life saved. Cases have been recorded of intractable hæmorrhage leading

to death following the extraction of teeth. Many practitioners take the precaution of inquiring whether there is any previous history of hæmorrhage before extracting teeth, and ask about the patient's reaction to injury and whether bruising easily occurs after blows to the surface of the body. The knowledge thus gained should be considered seriously. Older

Fig. 1.—Swelling of the gums in a case of scurvy.

persons who might be suffering from arteriosclerosis should be handled with great care, because in this condition the capillaries have lost their contractility and the blood-pressure is raised. This condition might be responsible for severe post-operative bleeding.

A hæmatologist's report will often help the dental surgeon to plan his treatment so that as few complications as possible may follow the extraction of teeth. In considering the report the following main points must be borne in mind:—

1. If there is a prolonged coagulation time hæmophilia, the leukæmias, anæmias, and jaundice should be suspected.

2. In acute leukæmias and purpuras there is a prolonged bleeding time. It is also noticed in cases where the fibrinogen of the blood is greatly reduced, as in serious liver disease. A condition in which there is a prolonged bleeding time and normal coagulation time can exist. In thrombocytopenic purpura where the platelets may be reduced from 300,000 per c.mm. to 50,000 there are not enough platelets to occlude the capillaries, but sufficient to allow the clotting process to commence.

One of the commonest causes of bleeding after oral surgery is trauma. The mucoperiosteum, one of the larger blood-vessels, or the alveolar bone may be damaged and bleeding may be increased because of local inflammation in the form of periodontitis, gingivitis, stomatitis, dental abscess, bone dyscrasias, and general diseases.

Purpura hæmorrhagica is a disease which predisposes to excessive bleeding. A case can be recalled of a patient referred for special treatment because of a history of excessive bleeding following dental extractions. On casual examination the patient appeared to be normal and quite healthy. A blood examination, however, gave a platelet count of 50,000, and the condition was diagnosed by a physician to be purpura hæmorrhagica. One tooth was extracted and the socket sutured immediately. Prolonged bleeding followed and was difficult to arrest. Later more extractions were undertaken after a blood transfusion had been administered. This time the post-operative hæmorrhage was greatly reduced. In another case a girl of 18 complained of spontaneous hæmorrhages from the nose and gum margins. This symptom was regarded with suspicion, because the gum tissue appeared to be quite healthy and free from gross calculus. When examined by a physician the patient was found to have bruises, ecchymoses, and petechiæ on the arms and other parts of the body. A differential blood-count clinched the diagnosis of thrombocytopenic purpura, although from a glance the patient appeared normal. Splenectomy was performed and the platelet count rose to 400,000 per c.mm.

Scurvy.—This is a disease not often encountered in these days of improved nutrition and better understanding of the vitamin-deficiency diseases. Scurvy is due to lack of vitamin C and the photograph (*Fig.* 1) illustrates one of its oral manifestations, i.e., swelling of the gums, which are maroon coloured and spongy, and with a tendency to

cover the teeth. The whole of the oral mucosa may show signs of hæmorrhages and the gums may slough. A pallor of the lips may be apparent owing to a secondary anæmia. Bleeding and bruising will probably be found in other parts of the body. In this condition the capillary resistance test is positive and severe bleeding may follow the extraction of teeth.

Leukæmia.—This disease has definite oral manifestations in the form of petechial hæmorrhages, hypertrophy of the gums, and sometimes necrosis. There is a widespread proliferation of the leucocytes and their precursors, although in a condition called aleukæmic leukæmia there is a marked reduction in the white cells. There are acute and chronic forms of myeloid and lymphatic leukæmia, in all of which tooth extraction is likely to be followed by prolonged bleeding. In the acute form especially, clot retraction is poor and the tourniquet test positive. Diagnosis is determined by the abnormality of the white cells, which are markedly increased, and there are many abnormal and immature cells in the circulation.

Case 1.—A 42-year old woman had had a number of teeth extracted on the left side and much bruising had resulted in the soft palate, floor of the mouth, and cheeks. There was a swelling in the submaxillary triangle area which was wrongly diagnosed as an abscess. Intramuscular penicillin was given and suspicion was aroused because several large hæmatomas appeared at the site of injection. In every other way the patient appeared reasonably well but for a slight pallor of the mucosa of the mouth. Neither jaundice nor cyanosis was noticed. There was a bruise over the right temple and the submaxillary swelling was a hæmatoma and not an abscess. The lymph-glands were normal, but the spleen was increased in size and palpable below the left costal margin on deep inspiration. The liver was not palpable. The blood-pressure was 130/90.

Blood-count:
Hæmoglobin 62 per cent Red blood-cells 2,900,000 per c.mm.
White blood-cells 3200 per c.mm.
Neutrophils 4 per cent Blast cells 3 per cent
Eosinophils 7 per cent
Lymphocytes 73 per cent
Monocytes 2 per cent
The erythrocytes showed moderate anisocytosis. Many hypochromic forms and the thrombocytes were absent.
The blood-picture suggested aleukæmic leukæmia.
Bones: No bony abnormality of the femora or pelvis.
Serum Alkaline Phosphatase, 3 units.

In a few weeks the patient developed a paronychia on the left middle finger, which was incised. By this time the white blood-cells had fallen to 1600 per c.mm. and the red blood-cells were 2·8 million per c.mm.

In view of the poor prognosis in the case of this patient it was decided to transfuse her with packed cells and allow her to return home. A few weeks later the patient was re-admitted with many points of sepsis. She was definitely anæmic and with a white blood-count of 2000 per c.mm. She was transfused and treated with penicillin, but death occurred shortly afterwards.

Case 2.—*Leucopenic Acute Myeloid Leukæmia.* A girl aged 21 years had suffered for a month from sore throat,

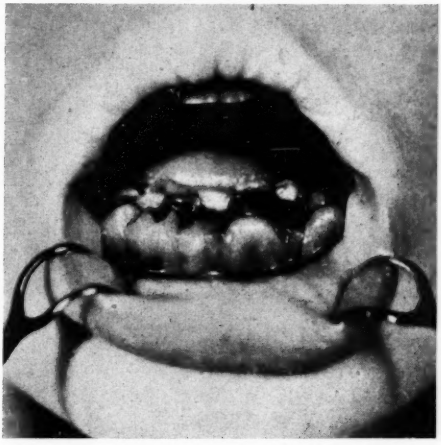

Fig. 2.—*Case* 2. Leucopenic acute myeloid leukæmia. Showing the grossly swollen gums.

swelling and bleeding of the gums, and fever. The gums were grossly swollen (*Fig.* 2) and there were shallow ulcers on the buccal and pharyngeal mucosa. Neither spleen, liver, nor lymph-nodes were palpable. Blood-counts showed a normal total leucocyte count, but the normal cells were myeloblasts. Sternal biopsy confirmed the diagnosis of acute leukæmia and the differential count of the marrow smears showed the complete replacement of the marrow by very primitive myeloid cells. The necropsy, after three months' illness, was typical of acute leukæmia.

Case 3.—A boy aged 15 years, who died nine days after admittance.

HISTORY.—Listlessness for three years, particularly in the summer. For the last eighteen months he had several attacks of fever lasting three or four days and associated with enlargement of the cervical glands. A month before admittance the cervical glands became swollen, the voice hoarse, and he lacked energy. Three weeks later he became much more tired and lifeless, and a rash appeared on his feet and legs. Three days before death a rash appeared on his eyelids and subconjunctival hæmorrhages appeared.

ON EXAMINATION.—A well-built boy with widespread purpuric rash on the legs, arms, face, and trunk. Bilateral subconjunctival hæmorrhages (*Fig.* 3) and bilateral fundal hæmorrhages present. Both tonsils grossly

enlarged and partially obstructing the airway. Enlargement of cervical (*Fig.* 4), axillary, and epitrochlear glands. Capillary fragility increased. Bruises were seen on the limbs (*Fig.* 5).

Cardiovascular System: Pulse 100: B.P. 110/60: Heart not enlarged; Sounds clear.

Respiratory System: Lungs clear.

Abdomen: Liver enlarged 3 in. below costal margin. Spleen enlarged 4 in. below left costal margin.

Fig. 3.—*Case* 3. Leukæmia. Showing bilateral subconjunctival hæmorrhage.

Investigations:—
Blood Hb. 11·2 g. per cent
Erythrocytes 4,350,000 per c.mm.
Leucocytes 686,000 per c.mm.

Differential:
Neutrophils: Band 1 per cent
Segmented 1·5 per cent
Monocytes 1·5 per cent
Large blast cells 52 per cent
Small blast cells 33·5 per cent
Disintegrated cells 10·5 per cent
Thrombocytes 20,000 per c.mm.

Supravital staining showed that the blast cells were neither typical lymphoblasts nor micromyeloblasts. Appearances were those of a stem-celled leukæmia.

PROGRESS.—An exchange transfusion had been planned for him, but in the afternoon he complained of sudden headache. Later he developed hemiplegia and became comatosed, with periodic breathing and irregular pulse, and died in the evening.

Pregnancy.—In general, there does not seem to be any special tendency to excessive bleeding during pregnancy, but the observations of Piney (1944) may be of interest to some practitioners: "A few purpuric spots may develop in any pregnant woman: but in cases of hyperemesis and of eclampsia, moderately severe purpura is not uncommon. This is not associated with reduction in the number of platelets, but appears to be allied to such anaphylactoid purpuric states as Schönlein's disease and Henoch's purpura.

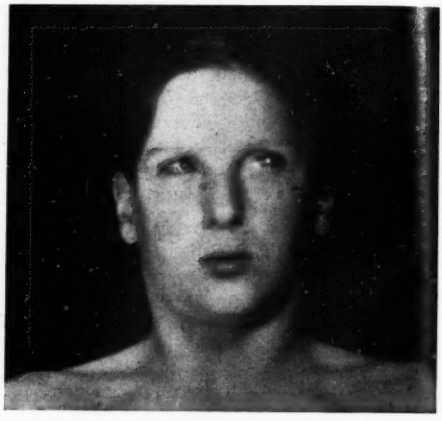

Fig. 4.—*Case* 3. Showing the enlargement of the cervical glands.

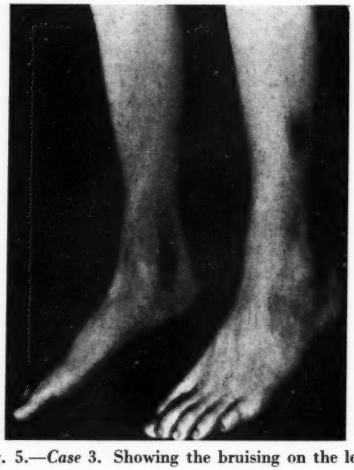

Fig. 5.—*Case* 3. Showing the bruising on the legs.

"Such intercurrent purpura does not seem to affect the prognosis at all: but the coexistence of pregnancy and purpura hæmorrhagica is a grave condition."

Anticoagulants.—Patients treated with the anticoagulants, heparin and dicoumarin, for arterial or venous disease sometimes develop an acute dental condition. In these cases, extraction of teeth would be followed by prolonged bleeding and should be postponed. Palliative treatment should be given until the effect of the drugs has passed off.

THE TREATMENT OF POST-EXTRACTION HÆMORRHAGE

Hæmorrhage in the mouth can be either spontaneous, or result from operative procedures. The measures used in the treatment can be either:—

1. General measures, which are usually prophylactic.
2. Local methods alone, or combined with general ones.

General Treatment.—The need for hesitation in treatment and a routine investigation of the blood in cases with a history of excessive bleeding following minor surgery has already been stressed. The general conditions which need special care and investigation are scurvy, primary and secondary purpuras, pernicious anæmia, obstructive jaundice, infective hepatitis, leukæmias, agranulocytosis, cirrhosis of the liver, and hæmophilia. Lester Cahn (1945) has pointed out that the prolonged use of acetylsalicylic acid (aspirin) may produce a prothrombinopenia and hence excessive bleeding. It should be made clear that only large quantities of the drug such as are given in the treatment of rheumatic conditions would produce this effect and that it can be counteracted by prescribing 1 mg. of vitamin K to every 5 gr. of aspirin.

Patients suffering from one of the serious blood diseases and who are in need of urgent dental extractions are best treated in hospital, where adequate facilities for investigation and treatment are at hand.

Cases of thrombocytopenic purpura are often successfully treated with splenectomy, which brings about a marked rise in the platelet count. Thoma (1948) recommends a diet containing hæmoglobin-building substances and vitamins (liver, kidney, eggs, prunes, and vegetables). Ascorbic acid and vitamin P would decrease the capillary fragility. At the time of operation, fresh blood transfusions should be ready in case of need.

Secondary purpuras are best treated by removing the cause, if possible, and by a blood transfusion. One of the hæmostatic agents, such as oxidized cellulose or Russel viper venom, may be used locally.

The anæmias should be corrected by administering iron preparations, or, in the case of pernicious anæmia, by liver therapy. In cirrhosis of the liver, obstructive jaundice, and infective hepatitis operation should be delayed until the condition has been corrected and vitamin-K therapy has restored the normal prothrombin level. Since its introduction, vitamin K has often been misused, for it has been given to patients who already have more than enough prothrombin in their blood and also to patients suffering from serious liver damage. Such patients will never respond to doses of vitamin K, and the practitioner would do well to study the modern views on this vitamin, which are well summarized by Cronkite and Irland (1950):—

"Administration of vitamin K can be of value only when there is a prothrombin deficiency due to a deficiency in vitamin K, which substance is essential for the synthesis of prothrombin by the liver. This condition is suggested by a tendency to bleed from minor wounds. Since vitamin K is synthesized by intestinal micro-organisms of the colon group, which release it upon disintegration, a dietary deficiency of this vitamin can occur when the intestines have been sterilized, as in prolonged sulphonamide therapy, or in the newborn before they have developed the normal intestinal flora. More frequently a deficiency in vitamin K is due to impaired absorption. Since the fat-soluble vitamin requires bile-salts for its absorption, a vitamin-K deficiency may be produced by such factors as biliary obstruction or fistula, advanced liver disease, insufficient bile excretion or intestinal disorders such as sprue, cœliac disease, and ulcerative colitis.

"The logical conclusion, therefore, is that vitamin K has no hæmostatic value in healthy individuals."

If operative interference is unavoidable in the leukæmias, blood transfusions are the only effective means of preventing or treating excessive bleeding. Whenever possible, dental extractions should be avoided.

Hæmophiliacs occasionally need dental extractions. Hæmophilia is an incurable disease and one in which very serious bleeding will follow the most simple operation. Patients suffering from the disease should be warned of its seriousness and encouraged to have conservative dental treatment regularly. When extractions have to be undertaken to relieve pain, transfusions of fresh blood should be given before the teeth are removed. General anæsthesia is to be preferred in many instances, especially in extraction of lower molar teeth, where inferior dental injection might be used. Hæmatoma formation in the pterygomandibular region would be an unpleasant complication for it might spread so far into the throat that respiration would be seriously interfered with. Thoma suggests that small amounts of blood (50–100 c.c.) will markedly reduce the coagulation time. Such transfusions should be repeated frequently until the bleeding ceases, and should be given before, during, and after the operation. Oozing of blood often continues for some days after the extraction.

For some time surgeons have used calcium salts as a prophylaxis against excessive hæmorrhage. The dose advised was 10 gr. of calcium lactate three times a day. In this way it was hoped to raise the blood-calcium and accelerate clotting. The author of this article has never found this effective and his clinical observations agree with those of many other investigators. To quote one of them, Quick (1940) says:—"Although calcium plays an exceedingly important part in the coagulation mechanism, it is very doubtful whether even the extreme variations in its concentration which occur pathologically can influence the clotting time. *In vitro* experiments indicate that the concentration of calcium within a fairly wide range has no significant influence on the rate of coagulation. No hæmorrhagic diathesis is associated with parathyropriva, although in this condition the calcium may reach the lowest concentration compatible with life. Ravdin, Riegel, and Morrison (1930) found that a patient in parathyroid tetany with serum-calcium of 4·6 mg. per 100 c.c. had a normal coagulation time. At present, therefore, it is not possible to name any clinical or experimental bleeding condition that can be attributed to a deficiency of calcium. Nevertheless, much remains to be known. The influence of ionized and unionized calcium on the stability of platelets may perhaps be of greater clinical importance than one would expect."

Local Methods of controlling Hæmorrhage.—To achieve hæmostasis three conditions are needed. These are: good vasoconstriction, agglutination of the platelets, and formation of fibrin; and any drug which assists these processes can be called a hæmostatic agent.

The vasoconstrictor commonly used is a liquor adrenalinæ hydrochloride applied locally on a pad of gauze and supplemented with pressure. Some oral surgeons inject a 1/1000 solution around the area of operation even though a general anæsthetic is to be used. Vasoconstrictors are often valuable, but could produce the opposite effect because the vasoconstrictive phase may be followed by dilatation, and if enough reaches the general circulation the blood-pressure may rise. There are no ways in which the agglutination of the platelets can be assisted. In the absence of platelets Cronkite and Irland (1950) claim that it is impractical to replace them by transfusion. They go on to say that if platelets behave abnormally, as they do in some hæmorrhagic disorders, transfusions may help.

The factors which are needed for normal coagulation of blood are now obtainable as extracts, and during the last few years good results have come from their use.

Thromboplastin is obtained as an extract from ox brain, but is of little value in most cases because enough of this substance is present in the tissues. Since thromboplastin helps to produce thrombin, much greater amounts of thrombin can be added to the injured area artificially than can be made in

the body of the patient. Messrs. Maw, Son & Sons, Ltd., of Barnet, supply thrombin. It is important to apply the solution to the bleeding point itself undiluted with blood or saliva. Hence the site should be swabbed and the thrombin solution dropped into it. Fibrin formation begins in a few seconds and hæmostasis will be achieved if the bleeding ends of the blood-vessels come under the influence of the solution. Good results will not be obtained if the thrombin is applied to a pool of blood, for although a clot will be formed, bleeding will continue under it.

Many have used fibrin foam with success, and this is a useful vehicle for thrombin and is a means of transmitting pressure to the cavity. Allen and Hanburys Ltd. manufacture what they claim is an "absorbable hæmostatic". This substance is a sterile dry sponge made by whipping a solution of gelatin into a foam, and drying and sterilizing it. It is a white spongy mass which is not friable and which can be cut into any shape or size. The manufacturers do not explain its action, but it is likely that as the blood enters the sponge the platelets are damaged and liberate thromboplastin. A matrix is also provided which will support the blood-clot. Gelatin sponge can be used as a vehicle for thrombin solution. Oxidized cellulose and alginate gauze have similar actions and uses to gelatin sponge. Oxidized cellulose is supplied by the Parke Davis Co. and is prepared from cotton by a process of oxidation in which cellulose is converted into polyanhydroglucuronic acid. It has the physical form of the original cotton, but is both hæmostatic and absorbable. It has been used in neurological, urological, abdominal, and gynæcological surgery and is supplied in sealed glass tubes as a sterile pad. The writer has found oxycel helpful in a number of difficult cases. A detailed report of clinical investigations into this substance is given by Nathan (1948). In oral surgery the cellulose is used in strips of gauze or in the form of a cotton. The latter has been more successful because the gauze has been found too friable. Pieces of the cotton are cut under aseptic conditions and lightly packed into the socket. It must not be packed too tightly because if the pack swells it will extrude the clot and infection may occur in the socket. Nathan suggests that the swelling is caused by two factors, the absorbability of the cotton and its resultant expansion in the socket, and the immediate reaction of the tissues to the acidity of the material. When the cellulose has been placed in the socket or bleeding area, it becomes engorged with blood and darkens in colour. The result is a sticky gelatinous mass which remains clean for at least twenty-four hours. Nathan reports that in none of his cases did infection follow the packing of the socket with the cotton. Reporting on a number of patients treated he says that "local expansion occurred in ninety-seven per cent of the cases. No necrosis was observed, nor signs of pyrexia. The time required for healing averaged from two to three days. No patient showed allergic manifestations."

Alginate wool sold as Calgitex has found favour with many dentists, but the claims of the manufacturers that it is absorbable must be accepted with reserve. Severe "flares up" have followed the suturing of cavities containing this material.

A hæmostatic serum (hæmoplastin), a preparation originated by Dr. Vincent Sapenta, is a derivative of blood-serum and tissues from bovine and equine sources mainly composed of prothrombin and thromboplastin in a physiologically well-balanced solution. Hæmostatic properties in those conditions where the blood does not coagulate effectively are claimed for it. Many of the solutions have been found unstable, and most surgeons prefer other agents which are not likely to produce the serum reactions which sometimes occur when hæmoplastin is used. These reactions are erythema, slight local pain, and numbness and pain in the joints, and are due to the patient's sensitivity to horse serum. In general, the reactions are not serious, but severe reactions do occur rarely following intravenous administration. Adrenaline solution 1/1000 has been found an effective antidote to allergic reactions.

Russel viper venom is now an established hæmostatic drug and is a thromboplastin-like substance which can convert prothrombin to thrombin in the presence of calcium. Powerful hæmostatic properties are claimed for it

even in very dilute solutions. Practitioners already know the best methods of using snake venom.

The hæmostatics which depend on their ability to coagulate proteins are well known. These agents coagulate healthy tissue and sometimes cause unnecessary necrosis of the mucoperiosteum surrounding the bleeding area.

Many modern authorities believe that they in no way compare with thrombin as a local hæmostatic agent and some go so far as to say that they have outlived their usefulness. To this group of drugs belong liquor ferri chloridi, aluminium salts in the form of alum, tannic acid, and perhaps turpentine, which is a counter-irritant and should promote hæmorrhage rather than arrest it.

Sulphonamide and penicillin preparations have sometimes been packed into cavities left by the oral surgeon in the hope that sepsis will be avoided and bleeding accelerated. The sulphonamides do not seem to interfere with the clotting of the blood. Excessive bleeding has followed packing with penicillin, and Fleming and Fish (1947) have noticed an increased tendency to bleeding after local penicillin therapy. It is said that to produce the effect penicillin must be in concentrations of over 1000 units per ml. The effect is absent if the drug is given systemically.

Although chemical agents can control hæmorrhage in many instances, simple surgical procedures give equally good and often better results. As a prophylaxis against bleeding, the operation must be done carefully and excessive laceration of the tissues avoided. If a large vessel, e.g., the greater palatine artery is damaged, and if it is not completely severed, bleeding will persist. Hence the operator must thoroughly examine the bleeding area and find the bleeding point. If an artery is only partly cut, it must be cut right through or crushed against the bone on which it lies. The writer always tries to suture the socket and usually succeeds in arresting bleeding. Only occasionally have other measures been needed. Thoma recommends in bone operations that the spongiosa be condensed with a burnisher, or that bone wax be placed in such a region as the mandibular canal. In serious bleeding from the greater palatine artery a peg may be inserted into the canal from which it emerges. Bleeding from the mucosa itself can be stopped by inserting a mattress suture through the mucosa and around the vessel. In extreme cases a surgeon might have to be called to tie the external carotid artery.

SUMMARY

The simplest theory of the way in which the blood clots has been given, and the agents which take part in the process have been briefly described. Conditions in which excessive bleeding is likely to occur have been described and simple means of detecting them suggested. The treatment recommended is one based on using the recently introduced drugs and extracts, and simple surgery rather than the older methods which depend on the caustics which coagulate proteins.

The writer is indebted to Dr. C. E. Davies for permission to publish *Cases* 1 and 3; and to Dr. Martin Hynes and the Clarendon Press for permission to publish *Case* 2. He also wishes to acknowledge the valuable co-operation of the Photographic Department of the Sheffield United Hospitals, who prepared the illustrations.

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CRITICS' CORNER

(Under this heading we print letters which discuss points arising from articles which have appeared in the DENTAL PRACTITIONER, *together with the comments of the authors when necessary. We trust that this section will prove of interest to all our readers and stimulate further discussion.)*

May 15, 1952.

To the Editor.

Dear Sir,

I must disagree very much with your contributor (Mr. Seear) about the correct method of removing Dentocoll impression (DENTAL PRACTITIONER, May, p. 268).

Far from never using force, the impression in all cases should be snapped out, and not removed gently. This also applies to Zelex, as it has been definitely proved that gentle removal tends to create drags, whereas an impression snapped out returns to its original shape.

Further, the method of lining a tray with adhesive plaster can be used equally successfully for Dentocoll as for Zelex.

A further part in using Zelex, I find, is the question of temperature. In winter, at very low temperature, the setting time can be very prolonged, unless the solution is warmed up, and vice versa in summer. We normally work at about 70° in winter and 65° in summer; naturally the solution will often have to be cooled in summer.

Yours faithfully,

J. GORDON.

13, Chapeltown Road,
Leeds, 7.

[I thank Mr. Gordon for his letter and would like to answer the points he raises.

Removal of Dentocoll Impressions.—My view is that force should not be used in the *first instance* until the "air seal" is broken, otherwise the impression material is likely to come away from its attachment to the tray, rendering the impression useless. Once the air seal is broken the impression should then be removed with a "snap".

Temperature of Zelex Solution.—I quite agree with Mr. Gordon and thank him for raising this point. Personally I keep my solution bottled, beside the sterilizer, in all but very warm weather, when it is kept shaded and away from all warm objects. I have never yet had occasion to cool the solution except when in a subtropical climate.—J. E. SEEAR.]

INSTITUTE OF BRITISH SURGICAL TECHNICIANS (INC.)

Dental Section

AN interesting and informative lecture on "Electro forming in Dentistry" was given to the members of the Dental Section at the Eastman Dental Hospital on May 20, by Mr. E. Rosenstiel, L.D.S., Assistant Lecturer in Operative Dental Surgery at King's College Hospital.

Illustrating his remarks by lantern slides, Mr. Rosenstiel described the apparatus used in electro forming, the advantages of this method of moulding and its application to dentistry in the provision of moulds for dental restorations and the manufacture of dental diamond instruments. The choice of a suitable metal was considered and a formula for a good plating solution suggested, after which designs of plating apparatus and the techniques employed in electro deposition were described and illustrated on the screen. The lecture concluded with a series of slides depicting in detail the various stages in the making of an inlay die from a copper-band impression.

Mr. H. J. Potter moved a vote of thanks to the Committee for arranging the lecture and also to Mr. J. Boswell for so ably presiding over the meeting. Mr. Boswell, on behalf of those present, expressed appreciation of Mr. Rosenstiel's very fine and comprehensive address.

WE learn that Johnson, Matthey and Co., Ltd. propose to form a subsidiary company in South Africa under the title of Johnson, Matthey and Co. (South Africa) Ltd., with offices in Johannesburg.

Mr. J. A. Shaw has been appointed Manager, and will leave for South Africa in September.

THE XIth INTERNATIONAL DENTAL CONGRESS

THE XIth International Dental Congress, being held at the Royal Festival Hall, South Bank, London, from July 19 to July 26, under the Patronage of H.M. Queen Elizabeth II, will bring to London the largest gathering of dentists—43 nations will be represented—ever known in this country. It will be opened by the Minister of Health, the Rt. Hon. Iain McLeod, M.P.

Held under the auspices of the Federation Dentaire Internationale, the Congress comes to this country for the first time.

For three years a committee of dental practitioners working from the Headquarters of the British Dental Association in Hill Street, London, have given up all their available time to the organization of this Congress.

Approach was made to the L.C.C. within a few days of the foundation stone of the Festival Hall being laid, and the committee was in fact the first body to be granted permission to hire the hall for anything but an orchestral concert; it will be the first occasion that Trade Stands have been erected inside the Hall.

The Congress has been divided into twenty sections. The most important part of the programme will be general discussions on a series of more than twenty International reports which have been compiled by some of the most eminent members of the profession throughout the world. These reports survey the whole field of dental science and will deal with the latest world developments in this field during the past five years.

They will have already been published before Congress opens, so that it will not be necessary for them to be read, but a résumé will be given by those presenting them, who include: Professor S. D. Tylman (U.S.A.); Professor Isaac Schour (U.S.A.); Dr. Shailer Peterson (U.S.A.); Dr. Malcolm Wallace Carr (U.S.A.); Professor A. Lundstrom (Sweden); Dr. Berger Ofstad (Norway); Dr. S. A. MacGregor (Canada); Dr. Alfred Steiger (Switzerland); Professor E. Matthews (Gt. Britain); Professor M. A. Rushton (Gt. Britain); Mr. John Gilbert (Gt. Britain); Professor J. Staz (South Africa); Dr. L. J. M. Spoorenberg (Holland); Dr. Lison (Belgium); Professor S. Palazzi (Italy); Professor R. Marguerite (France); Dr. Louis Grossman (U.S.A.); Dr. Balint Orban (U.S.A.); Dr. Henry Beyron (Sweden); and Professor Robert G. Kessel (U.S.A.).

The idea of publishing the reports in advance is to enable more time to be given to discussions, which will be opened by two outstanding dentists following the reading of the résumés.

Simultaneous translations in the five basic languages—English, French, Spanish, German, and Italian—will be given and heard through the headphones attached to the seating at the Royal Festival Hall.

Another feature will be the exhibition of scientific films, and a Scientific Exhibition, where members can see photographs, microphotographs, models, and apparatus, and can study these to follow out a particular technique.

There will also be Table Clinics for demonstrations—thirty each morning and afternoon, making sixty a day—where some of the most renowned members of the profession will demonstrate by models their methods of carrying out various techniques in dentistry.

An innovation will be the use of large-screen television. Where it is noticed that a demonstrator is attracting a large number of visitors, he will be asked to repeat the demonstration before television cameras, and the results will be shown in the famous Tele-kinema on the South Bank, and 400 people will be able to see what he is doing and hear what he says without overcrowding.

This will be the first time that a screen 18 ft. × 16 ft. has been used, and this latest method of television projection was decided upon as it is not otherwise possible for a crowd of people to watch what is being done to a particular tooth in such a confined area.

There will also be a Trades Exhibition, where on some fifty stands British and Overseas manufacturers will show the latest dental equipment.

All this takes place in the Royal Festival Hall, and only practising dentists will be admitted.

The public will be catered for in the County Hall—adjoining the Festival Hall—where a Dental Health Exhibition is being held and will be opened by Miss Pat Hornsby Smith, M.P.

The profession has staged this Exhibition to show what methods different countries are using to bring before their peoples the importance of the subject, and to illustrate by means of models, charts, and the projection of coloured transparencies the best way of keeping teeth in a healthy condition for as long as possible by home care.

Dr. Wilfrid E. Fish, O.B.E., President of the Congress, and Chairman of the Dental Board of the United Kingdom, said that at the Congress discussions will take place and members will hear about the never-ending search for better means of prevention. Thousands of patients have been examined, and the observations have been statistically recorded for comparison with the conditions found in other people living under different circumstances.

In this way it was found that the children of South Shields have only half as much dental decay as those of North Shields. This was traced to minute quantities of sodium fluoride in the drinking water of the former town. The fluorine found its way into the teeth and increased the resistance of the enamel.

Many towns in America have been adding fluorine to their water supplies, and at the Dental Health Exhibition a model of the plant used in the U.S.A. for fluorinating water will be shown.

Two films will have their première on the opening day of this Exhibition and will be shown all the week. One shows how a girl became a dentist, and the other takes one round the world from the remote fastnesses of Greenland to the cosy life of a caravan in the English countryside and reviews the problems of dental health. In simple non-technical language, visitors to this Exhibition will learn much to help them in the preservation of their own and their children's teeth.

A special ladies' committee will be responsible for providing a programme of tours arranged for the relatives and friends of members attending the Congress. These tours will be to places of interest in and around London and to beauty spots in various parts of the country.

There are also full programmes of evening entertainment, the highlight of which is the Congress Ball being held at the Albert Hall on Wednesday, July 23, when the décor seen at the last Chelsea Arts Ball will again be erected and dancing will take place to music played by two famous bands.

ABSTRACTS
from Other Journals

Noradrenaline (norexadrin)

A preliminary report is made upon noradrenaline. This substance is an adrenaline-like neuro-hormone occurring in practically all parts of the human body. After surveying the theory of humoral transmission of nerve impulses, data is given of the chemical, physiological, and pharmacological properties of noradrenaline, one of the active substances in this respect.

Its chemical properties are similar to adrenaline but it is more resistant to oxidation. Physiologically adrenaline may be looked upon as a substance which in case of emergency mobilizes the resources of energy, while noradrenaline primarily takes part in the regulation of the blood-pressure. The toxicity is considerably lower than that of adrenaline, but the local vasoconstrictor effect is slightly less pronounced.

In view of its physiological activity, the chemical stability, and the low toxicity, an investigation was undertaken to determine whether noradrenaline could be used effectively as a vasoconstrictor in local dental anæsthesia.—Berling, C., and Bjorn, H. (1951), *Odontologisk Revy*, **2**, 147.

Present Condition of Root Canal Treatment by Sulphonamides and Antibiotics

The classical method of treating infected root canals has nearly always been by the use of disinfectant solutions. However, a large number of research workers have searched for success by replacing the disinfectants with antibiotics, either singly or in combination. The author discusses the various actions of the newer antibiotics and the recent opinions expressed on their use. Although success seemed to be the rule in the initial stages of all this work, many authors are beginning to have a second opinion on these methods. Sulphonamide, penicillin, and streptomycin, whether used singly or in combination, all seem to have certain disadvantages. The author suggests that at the present moment antibiotics are only useful for the acute infectious processes, after which the treatment should be with disinfectants. Chronic infections have and still are treated by disinfectants. The article is followed by a long bibliography.—Castagnola, L., and Spati, P. (1951), *Schweize Mschr. Zahnheilk.*, **11**, 1158.

Efficiency of Dental Burs

A comparison of efficiency of fissure and inverted-cone type burs when cutting material with a hardness similar to dentine has been made, with particular reference to speed of rotation and force applied.

An observation of interest is that tungsten carbide burs cut at essentially the same rate as steel burs under comparable conditions, but retain their cutting edges longer. Carbide burs are more brittle and liable to breakage when subject to side-pressure owing to being embedded in the material being cut.

Burs with spiral grooves remove more material per unit time, but clog more readily than the straight cut burs.

There is a considerable difference in the amount of material removed per unit time by the inverted-cone type burs compared with the fissure bur. A No. 3 inverted-cone bur is capable of removing approximately five times the amount of material per unit time as a No. 1 fissure bur.

The results indicate that an increase in bur size, with other factors constant, will result in greater amounts of material being removed.—(1951), *J. dent. Res.*, **30**, *No.* 6.

A New Vasoconstrictor for Local Anæsthetic Solutions

The authors describe the results of a clinical investigation into the use of levo-arterenol, a recently discovered vasoconstrictor agent in local anæsthetic solutions, compared with adrenaline and nordefrin.

If adequacy of anæsthesia was the sole criterion, it would appear that a procaine solution 2 per cent with levo-arterenol 1–30,000 and tetracaine 0·15 per cent would be

the one of choice, as it gave 97·88 per cent adequate results.

This result, however, was obtained to some degree at the expense of a possibly higher incidence of side-effects. The investigation indicates, however, that arterenol has an undoubtedly valuable place as a vasoconstrictor suitable for local anæsthesia.—(1951), *J. dent. Res.*, **30**, *No.* 6.

Some Physical Properties of Amalgam

The authors have studied the physical properties of an amalgam alloy having particles of varying specific surface (actual surface area per unit weight of particles).

They found that the properties of alloy chips of the same thickness cut from different areas of the same ingot vary. The amalgam produced from alloy particles with the greatest surface area had the highest compressive strength. Compressive strength one hour after mixing increased with the specific surface. The same tendency was shown after 24 hours, but was less marked.—(1951), *J. dent. Res.*, **30**, *No.* 6.

Pigmented Adamantinomata

The authors describe a case of pigmented adamantinomata, which is a rare sub-group of tumours comprising the epithelial odontomata.

Until 1949 only 4 cases of this condition could be traced in the world of dental literature. The clinical course of these tumours is little known, and no reliable guide to the prognosis can be given.

At the age of six weeks a male infant appeared to have a white lump on the outer and right side of the lower jaw, which became progressively larger, and in October, 1943, the child was brought to the hospital, when the entire horizontal ramus of the mandible, extending from the midline of the chin to the angle of the ramus posteriorly, was seen to be enlarged by a hard swelling, the upper surface of which was partly cystic, with no involvement of the soft tissues. A radiograph showed a cystic bony tumour of the right horizontal ramus of the lower jaw, the nature of which was obscure.

On Oct. 18 an operation was performed and the tumour was exposed, curetted, and the periosteum and mucosa were re-sutured. By Dec. 9 the mouth had healed fairly well, but there was still marked hard swelling on the outer side of the right mandible present.

In March, 1944, the cystic tumour had recurred and was reported to be spreading, when the prognosis was considered to be hopeless, and no further treatment was advised.

On March 1, 1949, he again reported to the hospital, when a further radiograph showed an expansion of the horizontal ramus of the mandible in the right canine region, and the bone showed some irregular destruction in this area.

As the appearances were consistent with a recurrence of the tumour, it was considered that the prognosis was a melanotic adamantinoma.

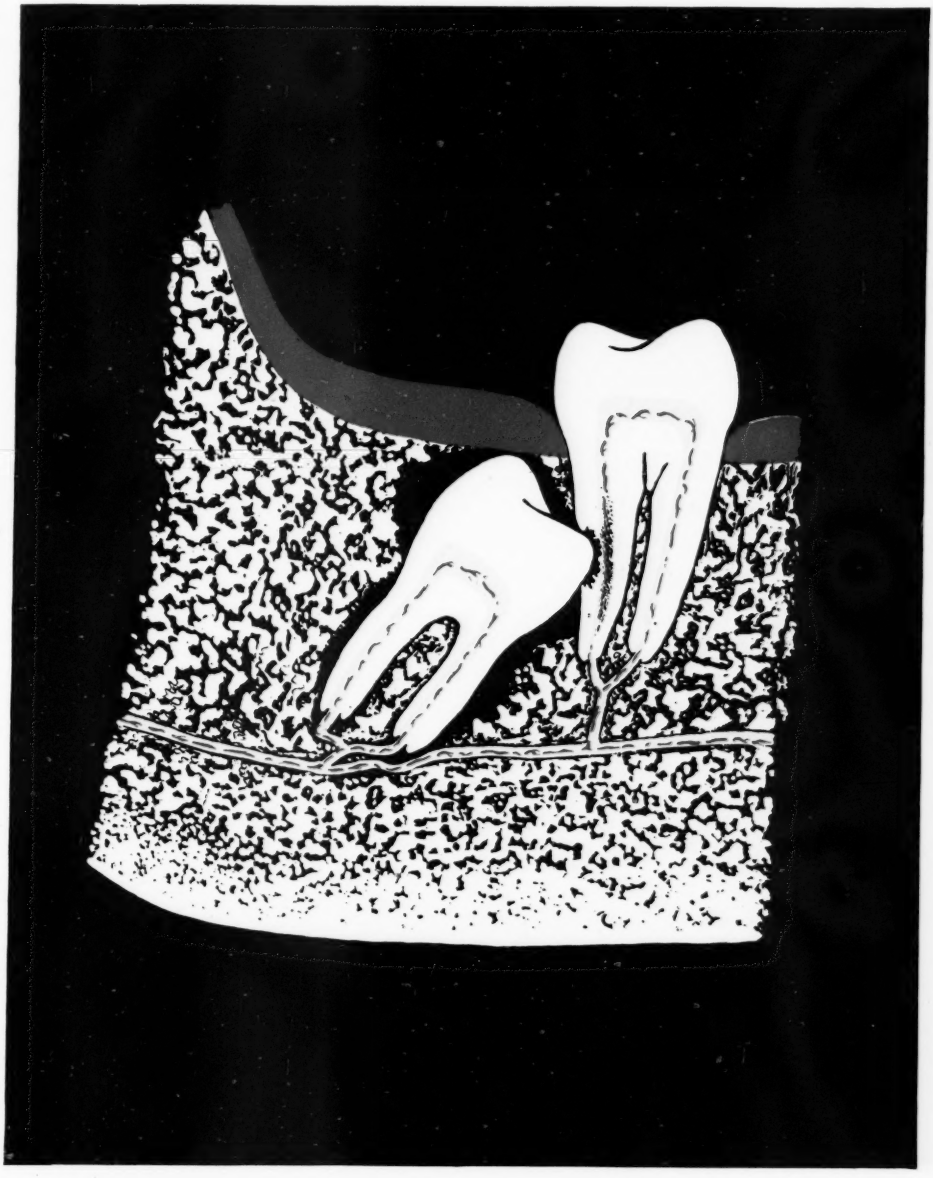
On June 9 a partial resection of the right horizontal ramus of the mandible was performed under intratracheal gas–oxygen–ether anæsthesia. The tumour-containing areas of the bone, together with half an inch of normal bone on either side, was resected, the oral mucosa sutured, and the skin incision closed with nylon sutures, which were removed after five days. Post-operatively, the upper and lower jaws were wired together with dental splints, previously constructed. Recovery was uneventful, and the wound healed by June 27.

On July 7 a further operation was performed under general anæsthesia to graft the bone in the gap in the lower jaw. Three inches of the eighth right rib was excised subperiosteally and the wound closed without drainage. The incision made at the previous operation on the mandible was then excised and the two bone ends of the mandible were exposed without damaging the oral mucosa. The outer table was removed from the right side of the mandible at each end of the gap and the rib graft was similarly prepared and cut to the length of the gap. The graft was then applied to the gap, being fixed at either end by a wire suture to the cut ends of the mandible. The soft tissues were closed in layers, and a drain

Issued with "The Dental Practitioner," July, 1952, Vol. II, No. 11

COLOURED CHART No. 12. (FOR YOUR PATIENT'S INSTRUCTION)

THE DANGER FROM THE IMPACTED TOOTH



If an impacted tooth is not attended to it may give rise to trouble. This picture shows an impacted lower wisdom tooth giving rise to pain due to pressure on the adjoining tooth and the nerve, and with infection around the wisdom tooth.

inserted. Intramaxillary fixation was re-applied. Post-operative penicillin was given. Six weeks after the operation the union of the graft had progressed satisfactorily to allow the fixation of the jaws to be discarded, and in eight weeks the patient returned to school with a clinical union at both ends of the graft.

Decalcified sections made from a segment of the mandible showed small clumps of melanin-containing cells arranged in alveoli and solid trabeculæ enclosed in a fibrous stroma. The distribution and amount of melanin-pigment granules within the cells obscured the alveolar pattern. There were no non-pigmented neoplastic cells present in this specimen.

In all these reported cases the tumour was noticed within the first four months of life and was quite painless. Incomplete removal of the tumour may result in a local recurrence of the growth. The absence of clinical glandular metastasis, even after six years' growth, gives reason to hope that the ultimate prognosis is good if these tumours are diagnosed and adequately treated.

Whereas non-pigmented adamantinoma is usually regarded as a tumour analogous to the basal-celled carcinoma of the skin, it is suggested that the pigmented adamantinoma may be analogous to the pigmented basal-celled cutaneous carcinoma.—Battle, R. J. V., Hovell, J. H., and Spencer, H. (1952), *Brit. J. Surg.*, **39**, 368.

The Application of Electromyography to Dental Research

This is a study of action potentials in the muscles of mastication. Variations in potential were picked up by surface electrodes, amplified, and recorded by means of a crystographic inkwriter. Reference is made to the analysis of the wave forms by means of the cathode-ray oscilloscope, and their relationship with the neuromuscular mechanism. Permanent records can be made by means of the inkwriter, films, or the sound amplifier recording on to magnetic tape.

The work of Moyers (*Amer. J. Orthodont.*, 1949) is quoted to show the way in which the temporalis muscle functions as separate anterior, middle, and posterior portions, the significance of proprioceptive impulses arising in the mouth in modifying the muscular activity, and the contribution on the lateral pterygoid and digastric muscles in depressing the mandible.

In the present study electromyographic records are discussed which were taken from the temporalis and masseter muscles of a number of patients. These records reflect variations in normal function and in certain types of functional abnormality. In normal occlusion the muscles of the working side showed very exactly co-ordinated activity, the masseter and the anterior portion on the temporalis being most active, and while the masseter of the balancing side recorded minimal activity, the posterior portion of the temporalis was functioning more vigorously than that of the working side, presumably acting as stabilizer of the condyle. In incisive chewing, the masseter was by far the most active muscle, showing short bursts of vigorous discharge. This type of record was found to be common to patients in whom lateral excursions were absent or limited.

In a case of Parkinson's disease, in which the tremor was shown clinically in the jaw and the tongue, the electromyogram demonstrated that the right temporalis was the only muscle involved. The record also showed the inhibition of the tremor in voluntary activity. In a case of myasthenia gravis, the onset of fatigue was clearly shown by a decline in the amplitude of the variations of the action potentials.—Pruzansky, S. (1952), *J. Amer. dent. Ass.*, **1**, 49.

Infantile Cortical Hyperostosis

The disease affects both sexes equally, but always becomes manifest before the age of six months. Its three cardinal signs are excessive irritability, localized swellings in the soft tissues, and periosteal thickening of various bones. This last feature is always seen in bones underlying the swellings of soft tissues, but it is often demonstrable radiologically in other bones. Fever, leucocytosis, and anæmia may also be present. The course of the disease

extends over months, with unpredictable remissions and relapses, but in all cases observed by Caffey (1950) complete clinical cure has resulted. Although the disease is probably not as uncommon in this country as would appear, its true incidence can be judged only if recognized cases are reported. Two cases as reported by the authors are as follows:—

Case 1.—A female infant, aged 15 weeks, was first seen at the hospital because of fever and swellings of the face. She had been well until a week previously, since when she had been feverish and fretful. On the previous day the right side of the face had been noticed to be swollen. The swelling was present over the whole length of the right side of the mandible and appeared to be part of the bone itself. It was not tender and the skin was unaffected.

Radiographs were taken and a provisional diagnosis of infantile cortical hyperostosis was made. The patient was seen in three days' time, when she was admitted to hospital with persistent pyrexia. Eight days after admission she developed diarrhœa and vomiting, which failed to respond to treatment and she died five days later.

Investigations.—Radiographs showed a periosteal thickening of the whole of the mandible, especially on the right side. No other bone was involved. At necropsy abnormal findings were confined to the mandible and the liver. The mandible showed along its whole length, thickening of the periosteum, which could be stripped easily from the bone. Microscopically the periosteum was considerably thickened and very cellular, with numerous osteoblasts forming new bone of immature form with imperfectly developed Haversian systems. There was no evidence of inflammation or of trauma. The liver showed fatty infiltration.

Case 2.—Male infant, aged 4 months, was first seen because of swelling of the jaw. He was well until a month old, when swelling appeared over the lower jaw, on each side, and he became irritable and refused full feeds. After about six weeks the facial swelling had subsided, but it recurred two weeks later and persisted. At no time had he been noticeably febrile. The only abnormal findings on clinical examination were swellings overlying both sides of the mandible and numerous small shotty glands in both posterior triangles of the neck. The swellings, which were hard and not tender, involved the whole length of the mandible and appeared to be part of the bone itself. The overlying soft tissues did not seem to be involved. Radiographs showed periosteal thickening involving the whole of the mandible, both tibiæ, and the left femur.

Progress.—The baby has been seen at intervals and remained in good general health. When he was 10 months old there was still visible swelling of the right lower jaw, although this was less marked than it was originally. Radiographs still showed periosteal thickening which was fusing with the cortex.

Infantile cortical hyperostosis has been regarded as primarily a disease of the bone, but the appearances of subcutaneous swellings as the initial manifestation and the microscopical evidence of changes in the blood-vessels suggest that these are the primary disturbances and are responsible for the bony changes. The term "infantile cortical hyperostosis" is a misnomer, since microscopical examination shows that it is in fact the periosteum which is thickened. Numerous fibroblasts appear in the periosteum which is lifted off the bone; subperiosteal bone is then formed, produces the bony swellings which may be palpable, and subsequently fuses with the cortex. Of all the bones, however, the mandible, clavicle, and ulna are most commonly involved. The fever and leucocytosis which are commonly found, point to an infection as the cause of the disease, and the peculiar age incidence suggests a prenatal origin.

A prominent feature of this condition is extreme irritability, which may be due to pain in the bones. The long course and marked irritability suggests an analogy to pink disease. The disease is, however, invariably benign and it would be wise to avoid admission to hospital.—MATHESON, W. J., and MARKHAM, MARY (1952), *Brit. med. J.*, **1**, 742.

"Tooth in Tonsil"

The following letter by Dr. Mouldon, as reported in the *British Medical Journal* for April 5, 1952, is reported verbatim as follows:—

"Foreign bodies embedded in the tonsils are sufficiently rare to warrant recording. I have just seen a 16-year-old girl who was referred to me because of the presence of something hard in the tonsil. This had caused no discomfort, but the patient noticed something unusual about the right tonsil when she was looking at her throat in the mirror. On examination, a greyish mass was seen at the site of the opening of the crypta magna of the right tonsil. This was hard and brittle to the touch. The mass was removed and found to be a rough concretion about $\frac{3}{8}$ by $\frac{1}{2}$ by $\frac{3}{8}$ in. (1 by 1·3 by 1 cm.), in which was embedded a primary incisor tooth. Neither the patient nor her mother could remember any incident in which a primary tooth could have been lost."

OFFICIAL SUPPLEMENT OF THE

SURGICAL INSTRUMENT MANUFACTURERS' ASSOCIATION (INC.)

DENTAL LABORATORIES SECTION

Chairman: E. G. EMMETT, F.I.B.S.T.
Administrative Offices: 6, HOLBORN VIADUCT, LONDON, E.C.1
Telephone: CITY 6031

Vol. II, No. 4 July, 1952

Editorial Committee: MR. D. M. BEAUCHAMP; MR. H. J. POTTER, F.I.B.S.T.

EDITORIAL

IT is to be expected that as we scan the foreign dental laboratory news, we find existing the same aspirations which occupy our minds in this country.

These are: the desire for cultural relations with the dental profession; their recognition of the importance of our work on a basis of mutual respect through consultation and co-operation; how to extend the incipient spirit of friendliness among competing laboratory owners, whether they be employers of large numbers or working alone; the support of attractive clinical programmes for technical education, which the surgeons will find worth while attending; the maintenance of full attendance at Branch meetings; and the securing of adequate remuneration for our work, enabling those of us who have employees to honour the agreements with the unions, while allowing a reasonable margin of profit.

It seems that all over the world solutions to these problems are being sought along the same lines.

For years the subject of "price" has occupied more discussion time, and divided our ranks more, than any other matter. How coincident with our experience here in England are the words of Mr. Leonard Darvin, of New York, whose reprinted article we feature this month, " . . . literally scores of groups have disbanded . . . because they talked 'price' . . . deep rooted seeds of discord . . . created distrust . . . among laboratory men . . . breaches which are almost impossible to heal".

Mr. Darvin expresses the belief that anything to do with price is secondary to raising the level of the laboratory craft by all possible means. The improved economics will follow.

CAN YOU BELIEVE IT?

A laboratory owner was finding difficulty with a surgeon who always maintained that when he asked for upper fronts to be brought down for the next try-in, they were in fact always pushed up.

In desperation, the laboratory man asked his client if he could see the next denture tried in which called for this alteration to the fronts.

This was duly arranged, and sure enough, the upper fronts which should have been lengthened according to the dentist's instructions were still too short. This rather proved the dentist's complaint.

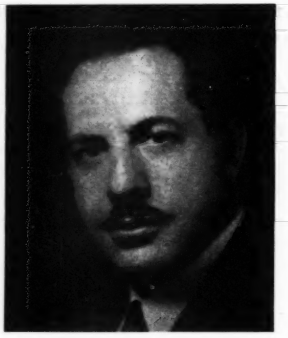
The patient was dismissed and the dentist then demonstrated how much he wanted the teeth moving; but much to the laboratory owner's surprise, the dentist put the try-in back on the model, turned it upside down and viewed it as a lower, saying, "Now, I want these teeth moving up another $\frac{1}{8}$ in."!

YOUR LABORATORY ASSOCIATION CAN PAY YOU DIVIDENDS*

By **LEONARD DARVIN**

Executive Secretary of the Dental Laboratory Association of the State of New York

Too many laboratory owners either do not join laboratory associations or become reluctant members because, they complain, "the association does nothing about raising



Mr. Leonard Darvin.

prices". They visualize an organization as having one purpose—that of causing a general rise in prices immediately upon its formation. If it fails to do that by its second or third meeting, they announce categorically that the organization is worthless and that their fellow laboratory men are "good-for-nothings who will never stick together".

Literally scores of local and even state laboratory groups have disbanded before they had a chance to cut their "eye-teeth" because they began to talk "price" at their meetings. And not only have these groups gone the way of the winds, but they have spread such deep-rooted seed of discord, that they frequently have created hatred and distrust among laboratory men in their areas—breaches which are almost impossible to heal.

ACHILLES' HEEL

The strange fact of the matter is that although raising of prices is not only the Achilles' heel of associations but is also illegal, a well-organized and properly administered laboratory group can and does accomplish that very purpose indirectly. In other words such an organization, without so much as discussing prices at any time, by its activities can raise the standards of the industry to a point where everyone in it almost inevitably finds himself in a better economic position.

By getting at the roots, the basic causes, of the laboratory man's problems, and taking positive action on them, an association can accomplish for the individual operator a definite, tangible improvement. I shall attempt to outline briefly in this short article some of these activities which can pay direct dividends to the laboratory owner. It is to be kept in mind that virtually none of these activities can be carried on by the laboratory owner himself without the aid of his association, unless he does so at a tremendous cost which would make such activity self-defeating.

TECHNICAL EDUCATION

Since we are engaged in a calling which requires a high degree of technical knowledge and information, a fundamental activity of a laboratory association is to disseminate such knowledge and information. This is done by periodic clinics and courses, conducted by the more experienced men in the field, or by the importation of outsiders such as dentists, dental manufacturers' representatives and scientists working with dental technics and materials. The laboratory association acts, as it were, as a medium of exchange of knowledge.

Considered purely from the economic standpoint, the acquisition of higher skills and greater knowledge is just as important to the laboratory man's pocketbook as a direct rise in prices. It is natural that one who possesses

*Reprinted from "Dental Laboratory Review", by kind permission of the Editor.

such superior knowledge will expect to receive a better rate of compensation than he would if he were behind in his technics. He then would have something more to sell than price. Since an association makes the new information available to all laboratory owners who are members, and not to just a chosen few in an area, the benefit accrues to the many in the industry and not to the few.

Associations have opened the hitherto closed doors of technical knowledge and have happily destroyed the old method of "hiding your knowledge under a bushel" for fear that your competitor will acquire it. Time has proved that the broad dissemination of knowledge in an area, the free exchange of technics between laboratory competitors, is just as helpful to the one who gives it away as to the one who receives it. This is due to the obvious fact that an educated competitor who has been built up to a higher level, is a better competitor. Price-cutting and chiseling are seldom, if ever, found among the quality laboratories in an area; it exists only among those who have no quality to sell.

Therefore, you can obtain a cash dividend from your association's educational program.

CREDIT EXCHANGE

Every laboratory must extend credit to its customers in order to obtain business. The checking of credit information thus becomes extremely important, as otherwise a definite percentage of the laboratory's income will be lost. With net profits in the laboratory industry being what they are, it should be remembered that every dollar lost to a bad account cannot be made up by anything less than seven to nine dollars worth of good business.

One of the major functions of a laboratory association is to provide a credit exchange and even a collection agency. This service need not be confined to the larger associations. By arrangement with some enterprising young lawyer or accountant in any town, however small, an association can set up an effective credit exchange and collection bureau. If the members co-operate by submitting the proper information, and sending their delinquent accounts for collection to the bureau, an invaluable service could be provided which, in effect, would mean more dollars to every member.

GROUP INSURANCE

Most laboratory owners work at the bench. If they are sick, their income either stops or is curtailed and their expenses are increased. Also, many laboratory owners are poor insurance risks, due to infirmity or age.

Any association can obtain group insurance for its members, covering sickness and accident, hospitalization, surgical and medical coverage, and even life insurance. The rates are always a substantial percentage below rates for similar policies on an individual basis, and the coverage is broader in all cases than in personal policies. It must be remembered that group insurance is available to all members, regardless of physical condition or past medical history, providing coverage otherwise unobtainable. Usually such policies are also non-cancellable.

The savings in premiums alone, particularly if there are partners and employees covered can amount to a substantial dividend each year to the members.

GROUP LEGAL AND ACCOUNTING SERVICES

In areas where common legal problems exist, such as are involved in labor relations, the employment of an attorney by the association to handle such matters can save each member involved substantial legal fees, as attorneys will handle the entire matter at a fee which makes each member's contribution small by comparison.

Associations may also employ an attorney to handle its members' affairs on a flat annual basis with respect to general matters. This also applies to the employment of an accountant which every laboratory needs. Not only will the member benefit from the group-fee, but an accountant so employed will become an expert in the laboratory field and will be in a position to render valuable advice as to costs and business methods without violating the confidences of any client.

GOVERNMENT RELATIONS

In these times when the government—national, state and city—takes so much of our gross and net incomes, it is important that every concession possible under the laws be obtained. Representations of problems to government agencies are far more effective on an association basis than by the most important individual.

For example, when the wage and hour law was amended to provide for a 75-cent an hour minimum, we obtained a ruling exempting messengers from the operation of this law. This ruling saved the laboratories many thousands of dollars.

In New York, we obtained reductions in workmen's compensation rates in certain instances; we obtained rulings making the prescription laws more workable; we caused the city to make its bid-specifications fairer for city work, all through organizational activity.

In each city and town, there are tax laws, zoning regulations, building codes, etc., operating to the financial detriment of laboratories, which can be corrected by organizational representation. All this adds up to real American dollars in the laboratory man's pocket.

Space does not permit detailed explanations of innumerable other activities and services laboratory associations can and do perform, but the preceding list will give you some idea of them. Larger associations operate employment bureaus to provide help, saving individual operators advertising costs. Others have welfare funds to aid members in poor circumstances; engage in group buying of materials; offer group messenger service, etc.

But the most valuable function of a laboratory association, which represents the aggregate of all its activities, is to create a friendly spirit among competitors in an area, and to raise the level of the industry. By raising the level of the laboratory craft, by instilling a feeling of self-respect and dignity in laboratory men, by bringing them up to a higher social level, associations automatically instil a desire for better living among their members. And this desire leads to a need for greater material success, which is just another way of saying that the association accomplishes inevitably that which is tabu on its agenda—the ultimate raising of prices.

NEWS FROM HEAD OFFICE

The Dentists Bill.—We learn that owing to the heavy programme of legislation now before the House of Commons it is unlikely that the Dentists Bill will be proceeded with in the immediate future and that it may not be introduced until next Session. In the meantime we shall continue to seek the co-operation of M.P.s and others who can assist us in our endeavours to obtain suitable amendments to the Bill. We hope that all our members will use their utmost efforts in their own localities in support of our policy.

The case for the dental technician was recently presented to the officials at the Ministry of Health who are dealing with the Bill, by a joint deputation from the trade unions and ourselves.

"*Z*" *Reserve Call-up.*—We would call attention to the fact that there is no obligation upon employers to pay their staffs during the period of their call-up under the "Z" Reserve Scheme unless this is provided for in their contract of service.

Fixation of Prices.—Further representations have been made to the Ministry of Health on the desirability of a fixation of prices for dentures and appliances supplied under the National Health Service with a view to eliminating cut prices and raising the standard of quality, and although up to the present we have failed to convince the Ministry, we shall continue our efforts to reach our objective in this matter.

Grade III Wage.—The trade unions have been informed by the employers' side of the N.J.C. that as Grade III does not include any fully skilled technicians they regard the present wage of £6 per week as adequate for this grade.

Wages during Sickness.—The following proposal for the amendment of the conditions relating to wages during sickness in place of those submitted by the trade unions has been suggested by the employers' side of the N.J.C. and is now under consideration by the trade unions.

The existing periods during which the technician is entitled to wages during sickness shall remain unaltered. During the period of full pay (two weeks in any one year), however, the employer shall be entitled to make the following deductions:—

26s. per week, representing the contributor's sickness benefit under the National Insurance Scheme, or (where applicable)

45s. per week, representing the employee's benefit under the Industrial Injuries Act in respect of injuries sustained in the course of his employment.

During the period of half pay (four weeks in any one year plus extension in certain circumstances) the employer shall be entitled to deduct half of the National Insurance or Industrial Injuries benefits set out above.

City and Guilds Syllabus and Examinations.—The syllabus for the City and Guilds Institute examinations has been revised and agreed by the Advisory Committee and will now be issued with a statement indicating that it has been approved by the National Joint Council.

The City and Guilds Institute is desirous of starting higher courses in dental technology for technicians who have passed the final examination of the City and Guilds Institute and the National Joint Council has agreed in principle to approach hospitals which might be likely to provide teaching facilities in the subjects concerned. The matter has accordingly been referred to the N.J.C. Education Advisory Committee for suitable action.

Exhibition of Practical Work.—The City and Guilds of London Institute proposes to hold an exhibition of practical work some time in November, when exhibits from the whole craft field covered by the Institute, including of course dental appliances, will be on view.

Change of Address.—The following new address should be noted:—

E. W. Sharp, 43, Weymouth Street, W.1.

IS THIS WHAT YOU ARE LOOKING FOR?

THIS month we refer to a most useful gadget for the laboratory. It is the "Handy Grinder", a fractional horse-power suspension motor with cable arm, operated by an accelerator type foot-control.

The motor, although rated at only $\frac{1}{18}$ h.p., is really robust in performance and delivers an infinite speed variation up to 5000 r.p.m. at will. It is useful for both grinding and polishing metal, acrylic, and vulcanite, and has an adequate reserve of power.

To transmit the power, the motor is fitted with a heavy duty cable which has a 5 mm. inner cable. The handpiece, new to dental equipment, is simple and automatic in action. When the bur or mandrel desired is placed in position it is ready for use without "slip joint" action or the use of spanner or tommy bar. The appliance is soundly constructed both mechanically and electrically, and may be used on 200 to 250 volts supply, D.C. or A.C. It is obtainable from any Dental Depot.

SUMMER CONFERENCE

Arrangements have been made to meet Mr. R. J. Rothstein, President of the National Association of Dental Laboratories Inc. of U.S.A., during his forthcoming visit to Europe this summer, and a One-day Conference has been arranged at the Holborn Restaurant on Saturday, July 19, with the following programme:—

11.30 a.m.—Informal reception by our president, Mr. E. G. Emmett. The chair will then be taken by vice-president A. J. Grant, of Brighton, who will introduce Mr. Rothstein.

1.0 p.m.—Luncheon for members and friends, presided over by Mr. Raymond Mather, of Cardiff.

2.30 p.m.—Wipla (Krupp's) film "Chrome-Cobalt Castings" screened by Gaumont-British Ltd. The chair will be taken by Mr. E. G. Emmett.

One of the perennial sources of refreshment to the world is the finding of men and women who sacrifice conjugal and domestic comfort to the service of their fellows without thoughts of anything in return.

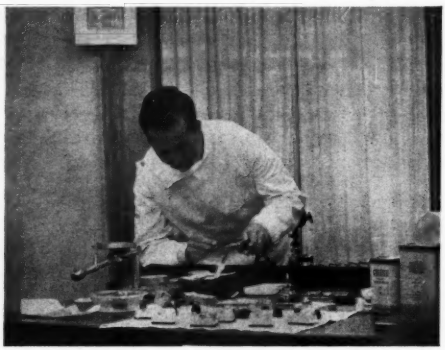
For years Mr. Emmett, assisted by Mrs. Emmett and his partner, Mr. A. Coode, has devoted much of his thought, time, and money to the help of dental technicians in general and S.I.M.A. in particular in an outstandingly gracious manner.

During the luncheon Mr. Rothstein will present Mr. Emmett with a gift from the members of the association as an expression of their thanks for all he has done.

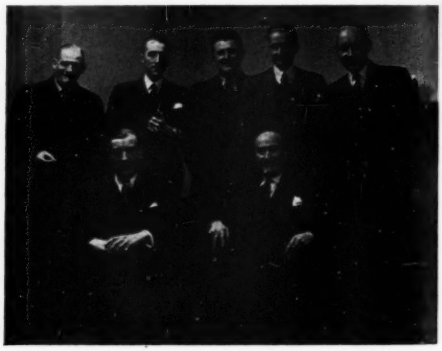
We hope members and their friends will endeavour to attend this conference to welcome our overseas visitors and honour our friend.

NEWS FROM THE BRANCHES

West of Scotland Branch.—Our photographs were taken by Branch correspondent Alex B. Rae at the meeting in Glasgow on April 17, when Mr. G. Miller gave his demonstration on dental casting.



Mr. G. Miller, of The Amalgamated Dental Co. Ltd.



Standing: Mr. C. J. Reid; Mr. J. S. Fountain; Mr. R. B. Wilson; Mr. W. W. Robertson; Mr. G. Barrie. *Seated*: Mr. A. C. Park; Mr. R. R. Marshall.

South Western Branch.—Over 50 per cent of our members attended the last meeting in May at Newton Abbot; this was a little less than usual. The July meeting will be held at 2 Osborne Place, Plymouth, and it is hoped that all laboratory owners in the area will endeavour to be present. Please note the date is changed from July 1 to July 8.

S.I.M.A. (DENTAL LABORATORIES SECTION) DIARY

South Wales and Monmouthshire Branch (*Hon. Secretary*: Mr. R. Mather, F.I.B.S.T., 16, Clodien Avenue, Cardiff).—Meeting, Thursday, July 3, at the Royal Hotel, Cardiff.

Croydon Branch (*Hon. Secretary*: H. J. Nowers, 86, Croydon Road, Beddington, Croydon).—Business meeting, September 19, 7.30 p.m., Six Bells, Handcroft Rd. Technical Demonstration meeting, October 24, 7.30 p.m., Norbury Library.

North Eastern Branch (*Hon. Secretary*: Mr. B. H. Shaw, 100, Morley St., Bradford, Yorks).—Meeting, Saturday, July 5, at the White Swan Hotel, Piccadilly, York.